The Aspin Bubbles proton (V2)

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Abstract: In the current version 2 of this article we incorporate all the modifications that we have introduced in the Aspin Bubbles project[1] and we mechanically build the proton particle and its antiparticle. The proton structure is very simple: two positons in a circular orbit around a negaton. As we will see in the article, we encounter perfect mechanical machines that meet and comply with all our knowledge on proton and antiproton.

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

1. Introduction

Let us make a brief summary of the behaviour of the Aspin Bubbles ether and matter[1].

The ether is a continuous and isotropic fluid. The ether fills all physical space and does not displace itself. Tons (matter) are immersed in the ether and disrupt it.

The ether modifies its elastic properties when the waves of the tons pass through it, in such a way that frequency and amplitude make it reduce its elasticity. As a result, the propagation velocity of the electromagnetic waves that run through the ether decreases and is lower than the speed of light.

The anharmonic pulsation of the tons membrane produces contractions and expansions in the ether that propagate at the speed of light. The ether is elastic and reproduces the asymmetrical movement of the ton membrane. It has an inertial non linear behaviour. Therefore, we have anharmonic longitudinal spherical waves that propagate through space and that are supported by the ether. Once the ether polarizes the tons are self-propelled through it due to the waves emitted by other tons.

In the case of the positon, contractions are stronger than expansions and in the case of the negaton it is the opposite. This is the reason why we state that tons polarize the ether through a wave field and why we have associated this behaviour with the classic concept of electric field. In order to understand the interaction existing between any two tons, we drew an analogy by assuming that the positon acts like a compression pump that hardens the ether and that the negaton acts like a suction pump that softens the ether.

The mechanical interaction produced in the ether between an anharmonic wave and a particle (ton) is simply electrical force and, thus, the force of gravity[2] is just a residue of the existing electrical forces between two neutral matters formed by tons.

Thus, we are not before static ether, but before dynamic ether configured through the existence of the tons that constitute matter. It is easy to imagine the force lines of the electrical and gravitational fields drawn in this ether.

The wave propagation velocity decrease in the proximity of matter led us, for instance, to the fact that light curves itself when it is close to the Sun[3].

It is also easy to imagine that Earth transports its own gravitational field; the ether, which fills everything, is configured with the displacement of the Earth. We have dynamic ether. This is the reason why the result of Michelson-Morley's experiment is correct. The aberration of light, or stellar aberration, as well as other physical phenomena are easily explained under this new approach.

And inside the matter, space among bound tons, the ether is very much configured (disrupted), which is the reason why refraction of light is produced. And if matter moves, the ether configuration produced by the matter tons moves too. This is the reason why Fizeau proved with his experiment of the speed of light passing through moving water that the speed of light is variable depending on the matter that it passes through and on its speed.

In addition, in our approach we stated that all tons spin around a diameter producing a new disruption of the ether; rotation involves a constant intrinsic angular momentum **S** respect to its centre of mass called **S** spin angular momentum. The ether must have certain viscosity, which is why the rotation of tons stretches and tightens its surrounding ether, propagating this behaviour at the speed of light. Thus, we were able to interpret the concept of magnetic field as a measure of the stretching and tightening of the ether (Biot-Savart Law). Therefore, this stretching and tightening of the ether also led us to interpret the displacement of tons with a velocity (Lorentz magnetic force)

Adding the two following hypotheses:

1ª) One negaton B not bound with other tons and with speed v, perforates the ether turning leftwards . Its vector **S** has the same direction, yet the sense is opposite to its trajectory,

2ª) One positon A not bound with other tons and with speed v, perforates the ether turning rightwards. Its vector **S** has the same direction and sense as its trajectory,

we generalise the Biot and Savart Law in this way:

$$\vec{B} = \frac{\mu_0}{4\pi} \frac{e\,v}{\vec{r}^3} \hat{s} \wedge \vec{r} \qquad (1)$$

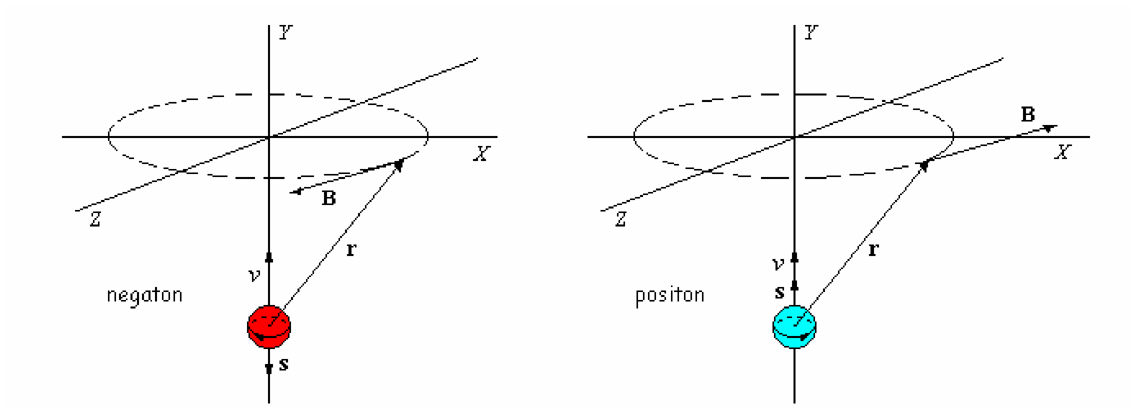

Figure 1.- Biot and Savart Law

where the produced vector magnetic field **B** was the magnitude that determined the characteristics of the ether, stretched, tightened and addressed by the ton at a point in space located at an **r** vector distance, which has a velocity v and where the direction and sense of vector **S** is represented by the unitary vector $\hat{s}$.

And for Lorentz magnetic force we said:

A ton with velocity v in a stretched, tightened and addressed uniform ether **B** will be subject to a force **F** the value of which is:

$$\vec{\mathrm{F}} = ev\,\hat{\mathrm{s}} \wedge \vec{\mathrm{B}} \qquad (2)$$

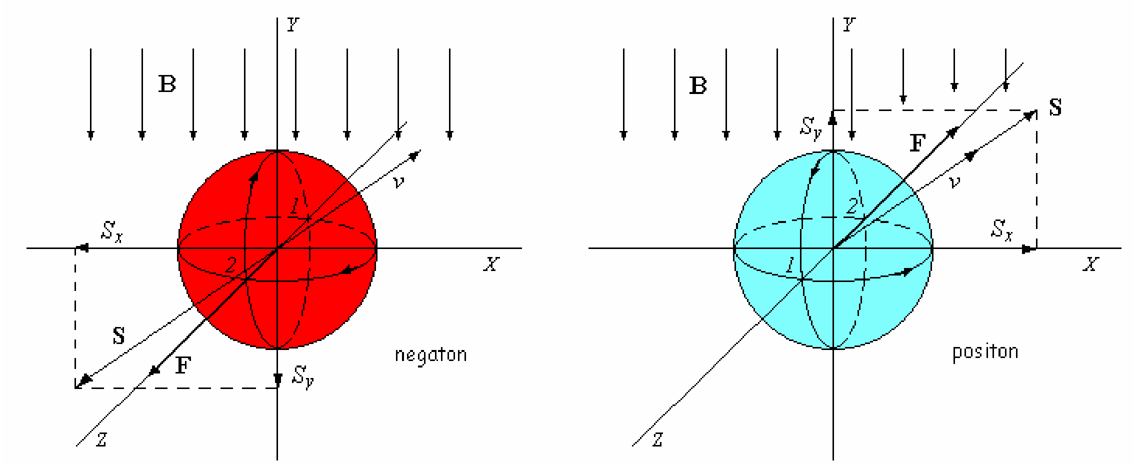

Figure 2. - Lorentz magnetic force

The reason for this relationship was as follows: According to the figure above, we can always decompose vector **S** of the ton in the plane determined by **S** and **B** into two components; $\mathbf{S}_y$ parallel to field **B** and another $\mathbf{S}_x$ perpendicular. The component $\mathbf{S}_y$ perpendicularly stretches and tightens the ether **B** equally in all directions, so there is balance. However, the perpendicular component $\mathbf{S}_x$ stretches and tightens more the ether in the direction and sense of **B**. The membrane, in its rotation, stretches and tightens more the ether **B** on the side that rotates in the direction and sense of **B** (side 1 of the ton), whilst on the opposite side (2) ether **B** loosens. Hence that the ether more tightened on one side than on the other produces a force **F** that we measure through the relationship (2). The tons are self-propelled in this anisotropy of the ether producing the magnetic force of Lorentz **F** (2).

Although we have not explained it until now, the tons have a spin magnetic moment $\vec{\mu}_S$ which has the same direction and sense as vector **S**. Hence that we have to modify the orbital magnetic moment $\vec{\mu}_L$ which produces a ton with velocity $\vec{v}$ in a circular trajectory which orbital angular momentum is $\vec{L}$ as follows:

$$\vec{\mu}_L = \frac{e \cdot \vec{L}}{2 \cdot m} \cdot (\hat{s} \cdot \hat{v}) \qquad (3)$$

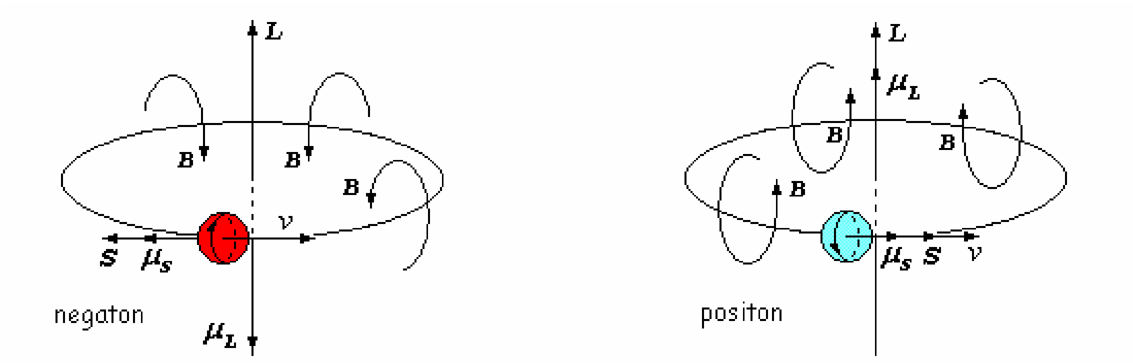

Figure 3. - Magnetic moment of a loop

where the factor $(\hat{s} \cdot \hat{v})$ is the scalar product of the unitary vectors of vector $\vec{S}$ and velocity $\vec{v}$.

The negaton, with its rotation and according to (1), tightens the ether inside the trajectory downwards producing in the loop a negative magnetic moment $\vec{\mu}_L$. And it is according to the expression (3)

$$\vec{\mu}_L = \frac{e \cdot \vec{L}}{2 \cdot m} \cdot (\hat{s} \cdot \hat{v}) = \frac{e \cdot \vec{L}}{2 \cdot m} \cdot 1 \cdot 1 \cdot Cos(180^o) = -\frac{e \cdot \vec{L}}{2 \cdot m} \qquad (4)$$

as the angle formed by vectors $\vec{S}$ and $\vec{v}$ is of 180°.

In the case of the positon, the angle formed by vectors $\vec{S}$ and $\vec{v}$ is of 0°, and therefore the magnetic moment $\vec{\mu}_L$ is positive. The rotation of the positon tightens the ether inside the trajectory upwards producing in the loop a positive magnetic moment $\vec{\mu}_L$.

Later we shall see, in the construction of particles, the use of the factor $(\hat{s} \cdot \hat{v})$ when the tons are forced by the magnetic fields (tightened ether) causing vectors $\vec{S}$ and $\vec{v}$ to form a determined angle between each other.

2. Modifications made in Aspin Bubbles[1]

Although it is not an actual modification, the Aspin factor, causing the asymmetry of the forces between tons to achieve gravity, can be simplified obtaining the following:

$$Aspín_i = \sqrt{1 + 2H_i + \delta_i 2\sqrt{H_i(H_i+1)}} = \sqrt{1+H_i} + \delta_i\sqrt{H_i} \qquad (4^*)$$

We had calculated that a rotating hollow sphere of radius r with constant spin angular momentum $\vec{S}$, and with a unit of electrical charge e distributed uniformly throughout its entire surface, produced the following spin magnetic moment $\vec{\mu}_S$:

$$\vec{\mu}_S = \frac{e \cdot \overrightarrow{\omega_S} \cdot r^2}{3} \qquad (5)$$

where $\overrightarrow{\omega_S}$ was the angular velocity.

The tons are pulsatory hollow spheres where the radius r of the membrane is subject to the following expression:

$$r = r(\omega t) = \left(r_0 + A_0 \sin[\omega t]\right)^x \qquad (6)$$

And considering that:

$$\vec{S} = I \cdot \overrightarrow{\omega_S} \qquad \text{and} \qquad I = \frac{2}{3} \cdot M \cdot r^2 \qquad (7)$$

where I is the moment of inertia of the ton membrane, replacing in (5) we will obtain that the spin magnetic moment is:

$$\vec{\mu}_S = \frac{e \cdot \overrightarrow{\omega_S} \cdot r^2}{3} = \frac{e \cdot \vec{S}}{2 \cdot M} \qquad (8)$$

M being the passive mass of any ton which is the amount of mass of the membrane.

We have found that the absolute value of the spin magnetic moment $\vec{\mu}_S$ of any ton with mass m is:

$$\vec{\mu}_S = \frac{g_{AB}}{2} \cdot \frac{e \cdot \vec{S}}{m} \qquad (9)$$

where g_{AB} is a new gyromagnetic coefficient, which value is:

$$g_{AB} = 1,009640492374899.... \qquad (10)$$

The definitive relationship existing between the active mass m of a measured ton and the passive mass M of its membrane is obtained by equalling the expressions (8) and (9), which is:

$$m = g_{AB} \cdot M \qquad (11)$$

(in Aspin Bubbles[1], we said that the relationship was 2).

Later we shall see the essential role of this coefficient in the construction of the proton and of any particle formed by tons and the way to obtain it. The proton is the basic particle of all matter.

In a subsequent article we will demonstrate that it is possible to obtain Einstein's relativity formulas (distance, velocity and acceleration) by making a small change in the wave-ton mechanical interaction when the ton has some velocity. We will also consider the structure of the photon and the Compton effect. These three facts have implied some important modifications in the hypotheses (22) and (23) of Aspin Bubbles[1], which remarkably improve the results for the particle size. These modifications are as follows:

1ª) The mass m of a ton does not vary with velocity, but if we increase its velocity in a particles accelerator its internal energy increases due to an excitement factor τ, that is:

$$E_i = \tau \cdot m \cdot c^2 = \frac{1}{2} \cdot h \cdot \nu = \frac{1}{2} \cdot \hbar \cdot \omega \qquad (12)$$

2ª) And this internal energy E_i is the maximum kinetic energy T of the membrane when it is in its balance position R_I and its velocity v is maximum (v_M)

$$T(R_I) = E_i = \frac{1}{2} \cdot M \cdot {v_M}^2 \qquad (13)$$

If $\tau = 1$, we obtain Einstein's equation $E_i = m \cdot c^2$, only valid for particles at rest or with some velocity which have not been excited according to Aspin Bubbles.

The equations (11), (12) and (13) imply that the definitive radius of the membrane of a ton i in balance position is:

$$R_{iI} = \frac{\hbar}{m_i \cdot c} \cdot \sqrt{\frac{g_{AB}}{2 \cdot \tau_i}} \cdot Aspin_i \qquad (14)$$

which replaces the boundary condition (30) of Aspin Bubbles[1].

Finally, in order to be able to calculate correctly and numerically the parameters $\{r_0, A_0, x\}$ of the movement equation of the membrane (6) of the ton which determines its dimensions, it is necessary to modify the boundary condition (25) of Aspin Bubbles[1] by simply replacing the mean radius R_i with the radius of the balance position R_I.

With these modifications, the mechanical interaction $F_{ij}(d)$ of the anharmonic wave i over ton j or in other words, the electric force $F_{ij}(d)$ exerted by ton i over ton j separated by a distance d is:

$$F_{ij}(d) = \delta_i \sqrt{\frac{\tau_i}{\tau_j}}\, m_i\, a_j\, \frac{R_{iI}\, R_{jI}}{d^2 - R_{jI}^2} = \delta_i\, \delta_j\, \frac{Aspin_i}{Aspin_j} \frac{k\, e^2}{d^2 - R_{jI}^2} \qquad (15)$$

where the unitary charge e is simply a positive constant with the following value:

$$e = R_{iI} \sqrt{\frac{\delta_i\, m_i\, a_i}{k}} \qquad (16)$$

3. The proton

The proton has three tons, two positons A in orbit around a negaton B. The masses m_A of the positons are equal. The mass of the negaton, m_B, is different. Consequently, the positons have the same pulsation frequency and are in phase, and the negaton has a different frequency (see 12). A view of the proton at different special instants seen from above would be as follows:

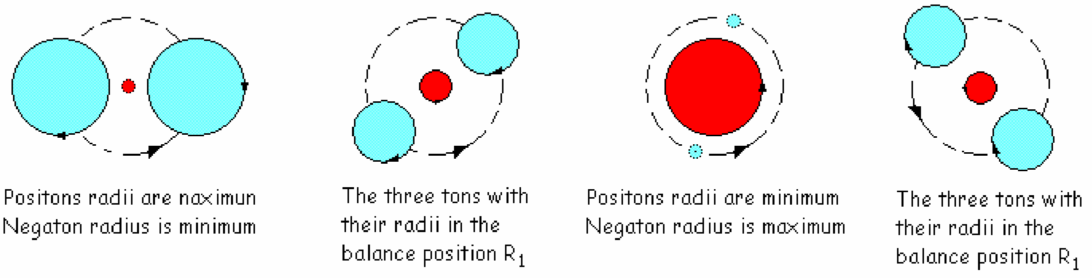

Figure 4. - Sequence of the proton

In this sequence of proton instants, both the size of the tons and their orbital radius are not to scale. We will subsequently see the real value of their maximum and minimum radii, that of their balance position R_1 and their orbit.

3.1 – Calculation of the masses

In the decay of the neutron in proton plus electron plus antineutrino

$$n = p + e + \overline{\nu_e} \tag{17}$$

we consider that the neutron and the antineutrino, as they are neutral particles, have the same amount of positonic and negatonic mass. Applying the mass conservation law we shall obtain:

for positonic mass A $\rightarrow$ $$\frac{m_n}{2} = 2 \cdot m_A + \frac{m_\nu}{2} \tag{18}$$

and for negatonic mass B $\rightarrow$ $$\frac{m_n}{2} = m_B + m_e + \frac{m_\nu}{2} \tag{19}$$

substracting both equations $\Rightarrow$ $$0 = 2 \cdot m_A - m_B - m_e \tag{20}$$

and taking into account the definite structure of the proton, its mass is:

$$m_p = 2 \cdot m_A + m_B \tag{21}$$

thus, resolving the system of equations (20) and (21) it is finally obtained that:

the mass of the positons is $\rightarrow$ $$m_A = \frac{m_p + m_e}{4} \tag{22}$$

and the mass of the negaton $\rightarrow$ $$m_B = \frac{m_p - m_e}{2} \tag{23}$$

Note that the mass of the negaton m_B is almost twice the mass of the positons m_A

$$\frac{m_B}{m_A} = 2 \cdot \frac{m_p - m_e}{m_p + m_e} \cong 2 \tag{24}$$

3.2 – Binding forces

Schematically, the forces existing in the proton's structure are represented in the following figure:

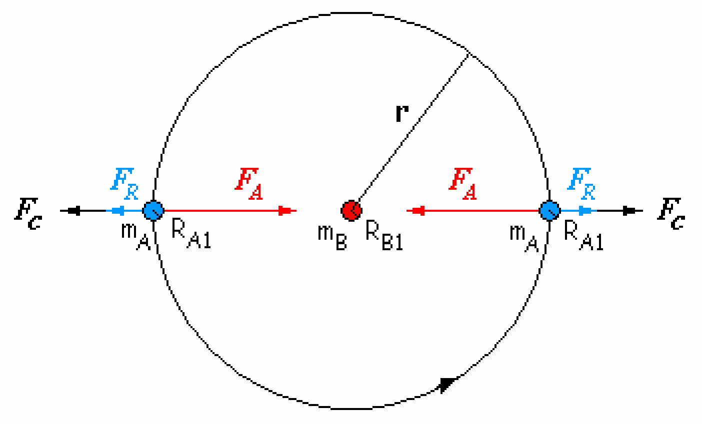

Figure 5. - Binding forces

Applying the mechanical wave-ton interaction (15) we have:

.- The attraction force that negaton B exerts over positons A

$$F_A = F_{BA} = \delta_B \cdot \delta_A \cdot \frac{Aspin_B}{Aspin_A} \cdot \frac{k \cdot e^2}{r^2 - R_{A1}^2} = -\frac{Aspin_B}{Aspin_A} \cdot \frac{k \cdot e^2}{(x^2 - 1) \cdot R_{A1}^2} \qquad (25)$$

where we change the variable $x = r / R_{A1}$

.- The repulsive force that positons A exert among each other

$$F_R = F_{AA} = \delta_A \cdot \delta_A \cdot \frac{Aspín_A}{Aspín_A} \cdot \frac{k \cdot e^2}{(2r)^2 - R_{A1}^2} = \frac{k \cdot e^2}{(4x^2 - 1) \cdot R_{A1}^2} \qquad (26)$$

.- The centrifugal force due to the orbital movement of the positons

$$F_C = \frac{L^2}{m_A \cdot r^3} = \frac{n^2 \cdot \hbar^2}{m_A \cdot r^3} \qquad (27)$$

taking into account that the positons have an orbital angular momentum in absolute value $L = n \cdot \hbar$, where n is a number to calculate.

At all times it is complied that $-F_A = F_R + F_C$. Thus, simplifying we obtain the following equation:

$$\frac{Aspín_B}{Aspín_A} \cdot x^3 \cdot (4x^2 - 1) - x^3 \cdot (x^2 - 1) - \alpha_0 \cdot (x^2 - 1) \cdot (4x^2 - 1) = 0 \qquad (28)$$

where $\alpha_0 = \frac{n^2 \cdot \hbar^2}{m_A \cdot R_{A1} \cdot k \cdot e^2}$. In this equation our unknowns are x and n.

3.3 – Orientation of the angular momenta S

In the construction of the proton we have to achieve that the magnetic fields produced by the tons have the same direction than their spin angular momenta, that is, momenta and fields have to be aligned. Applying the generalised law of Biot and Savart (1) we have obtained the following:

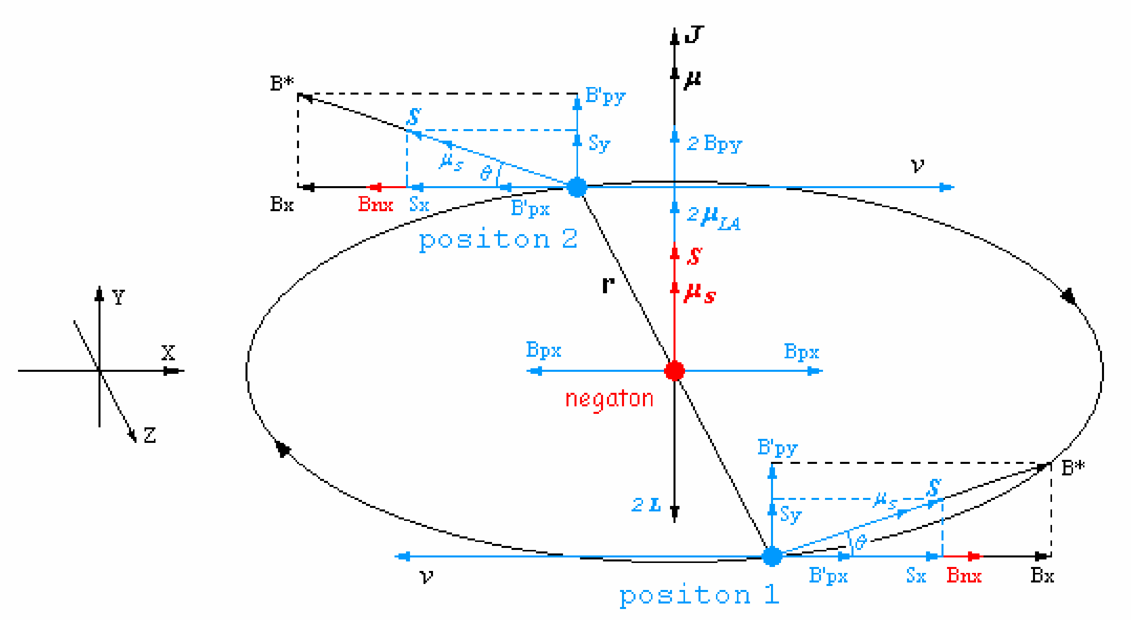

Figure 6. - Alignement of fields B with spin angular momenta S

.-The spin angular momenta **S** of positons 1 and 2 are inclined upwards regarding their orbit forming an angle θ with the direction of their velocities v.

.- We decompose vector **S** of the positons in their components $\overrightarrow{S_x}$ and $\overrightarrow{S_y}$.

.- The rotation components $\overrightarrow{S_x}$ of positons 1 and 2 create in the negaton equal magnetic fields upwards, which module is

$$\mathrm{B_{py}} = \left| \frac{\mu_0}{4\pi} \frac{e v}{\vec{\mathrm{r}}^3} \widehat{s_x} \wedge \vec{\mathrm{r}} \right| = \frac{\mu_0}{4\pi} \frac{e v}{r^2} Cos(\theta)\ Sen(90^{\circ}) = \frac{A}{r^2} Cos(\theta) \qquad (29)$$

being the unitary vector $\widehat{s_x} = \hat{s} \cdot Cos(\theta)$ and noting $A = \dfrac{\mu_0 \, e v}{4\pi}$ (30)

.- The rotation component $\overrightarrow{S_x}$ of positon 1 produces an upwards magnetic field in the positon 2 the value of which is

$$\mathrm{B'_{py}} = \frac{A}{4r^2} Cos(\theta) \qquad \text{as the distance between them is } 2r \qquad (31)$$

.- The rotation component $\overrightarrow{S_x}$ of positon 2 produces the same magnetic field in positon 1.

.- The rotation $\overrightarrow{S_y}$ components of the positons produce opposite magnetic fields in the negaton the values of which are

$$B_{px} = \left| \frac{\mu_0}{4\pi} \frac{e\,v}{\vec{r}^3} \widehat{s_y} \wedge \vec{r} \right| = \frac{\mu_0}{4\pi} \frac{e\,v}{r^2} Sen(\theta)\ Sen(90^o) = \frac{A}{r^2} Sen(\theta) \qquad (32)$$

being the unitary vector $\widehat{s_y} = \hat{s} \cdot Sen(\theta)$

.- The rotation $\overrightarrow{S_y}$ components of the positons create fields in their opposite positons, the values of which are

$$B'_{px} = \frac{A}{4r^2} Sen(\theta) \qquad \text{as the distance between them is } 2r \qquad (33)$$

.- Lastly, the rotation of the negaton, vector **S**, creates fields on the positons the values of which are $B_{nx} = \frac{A}{r^2}$. (34)

In light of the above, if we look at fields B_{nx} y B'_{px} they have the same direction and sense, which is why the positons will undergo a resulting field

$$B_x = B_{nx} + B'_{px} = \frac{A}{r^2} + \frac{A}{4r^2} Sen(\theta) \qquad (35)$$

and the vector addition of fields B_x and B'_{py} result in B^* field vectors which are aligned with vectors **S** of the positons as we intended at the beginning. In positons, the field B^* always penetrates through the base of vector **S**, thus being the proton completely stabilised.

Now we can calculate the value of angle θ, which fulfils the relationship:

$$\tan(\theta) = \frac{B'_{py}}{B_x} = \frac{\frac{A}{4r^2} Cos(\theta)}{\frac{A}{r^2} + \frac{A}{4r^2} Sen(\theta)} = \frac{Cos(\theta)}{4 + Sen(\theta)} \qquad (36)$$

Solving this equation we will obtain that:

$$Sen(\theta) = -1 + \frac{\sqrt{6}}{2}\ , \text{ then } \quad \theta = 12{,}9878...^o \qquad (37)$$

3.4 – Total magnetic and angular momenta

From figure 6 for the proton, we obtain the following equation for angular momenta:

$$\vec{J} = 2\vec{L} + \vec{S} + 2\vec{S} \cdot Sen(\theta) \qquad (38)$$

Considering that the total angular momentum $\vec{J}$ of the proton is equal to that of the tons and that its value is

$$\left|\vec{J}\right| = \left|\vec{S}\right| = \alpha \cdot \hbar \qquad (39)$$

we obtain from (38) that the orbital angular moment of the positons is

$$L = -S \cdot Sen(\theta) \tag{40}$$

and, taking into account (27) and (39), the numerical value of n is

$$n = -\alpha \cdot Sen(\theta) \tag{41}$$

Let us note that the values of L and n are negative, which implies that positons spin in their orbit the other way round, as it is indicated with the speed v in Figure 6.

We obtain the following equation for the magnetic momenta:

$$\vec{\mu} = \overrightarrow{\mu_{SB}} + 2 \cdot \overrightarrow{\mu_{SA}} \cdot Sen(\theta) + 2 \cdot \overrightarrow{\mu_{LA}} \tag{42}$$

where $\vec{\mu}$ is the total magnetic momentum of the proton. Let us develop these terms:

.- According to (9), the value of the spin magnetic momentum of the negaton is

$$\mu_{SB} = \left|\overrightarrow{\mu_{SB}}\right| = \frac{g_{AB}}{2} \cdot \frac{e \cdot S}{m_B} \tag{43}$$

.- The positons have a spin magnetic momentum of value

$$\mu_{SA} = \left|\overrightarrow{\mu_{SA}}\right| = \frac{g_{AB}}{2} \cdot \frac{e \cdot S}{m_A} \tag{44}$$

.- And the value of the magnetic momentum produced by the positons in the loop according to (3) is

$$\mu_{LA} = \left|\overrightarrow{\mu_{LA}}\right| = \left|\frac{e \cdot \vec{L}}{2 \cdot m_A} \cdot (\hat{s} \cdot \hat{v})\right| = \frac{e \cdot L}{2 \cdot m_A} \cdot Cos(180^{\circ} - \theta) = -\frac{e \cdot L}{2 \cdot m_A} \cdot Cos(\theta) \tag{45}$$

Let us note that this value is positive, as the orbital angular momentum L has a negative value.

Consequently, the value of the total magnetic momentum of the proton, according to the equation (42) is

$$\mu = \left|\vec{\mu}\right| = \frac{g_{AB}}{2} \cdot \frac{e \cdot S}{m_B} + g_{AB} \cdot \frac{e \cdot S}{m_A} \cdot Sen(\theta) - \frac{e \cdot L}{m_A} \cdot Cos(\theta) \tag{46}$$

and according to (39) and (40) we can also express this momentum depending on J as follows

$$\mu = \frac{g_{AB}}{2} \cdot \frac{e \cdot S}{m_B} + g_{AB} \cdot \frac{e \cdot S}{m_A} \cdot Sen(\theta) + \frac{e \cdot S \cdot Sen(\theta)}{m_A} \cdot Cos(\theta) =$$

$$= \left[g_{AB} \cdot \frac{m_A + 2 \cdot m_A \cdot Sen(\theta)}{2 \cdot m_A \cdot m_B} + \frac{Sen(\theta) \cdot Cos(\theta)}{m_A} \right] \cdot e \cdot S = \gamma \cdot J \tag{47}$$

being $\gamma = \left[g_{AB} \cdot \dfrac{m_A + 2 \cdot m_A \cdot Sen(\theta)}{2 \cdot m_A \cdot m_B} + \dfrac{Sen(\theta) \cdot Cos(\theta)}{m_A} \right] \cdot e = \dfrac{\mu}{J}$ (48)

3.5 – Larmor precession frequency

If we submit this proton to an external magnetic field $\vec{B}$, its magnetic moment $\vec{\mu}$ precesses around field $\vec{B}$ analogously to the precession of a spinning top around the gravity field.

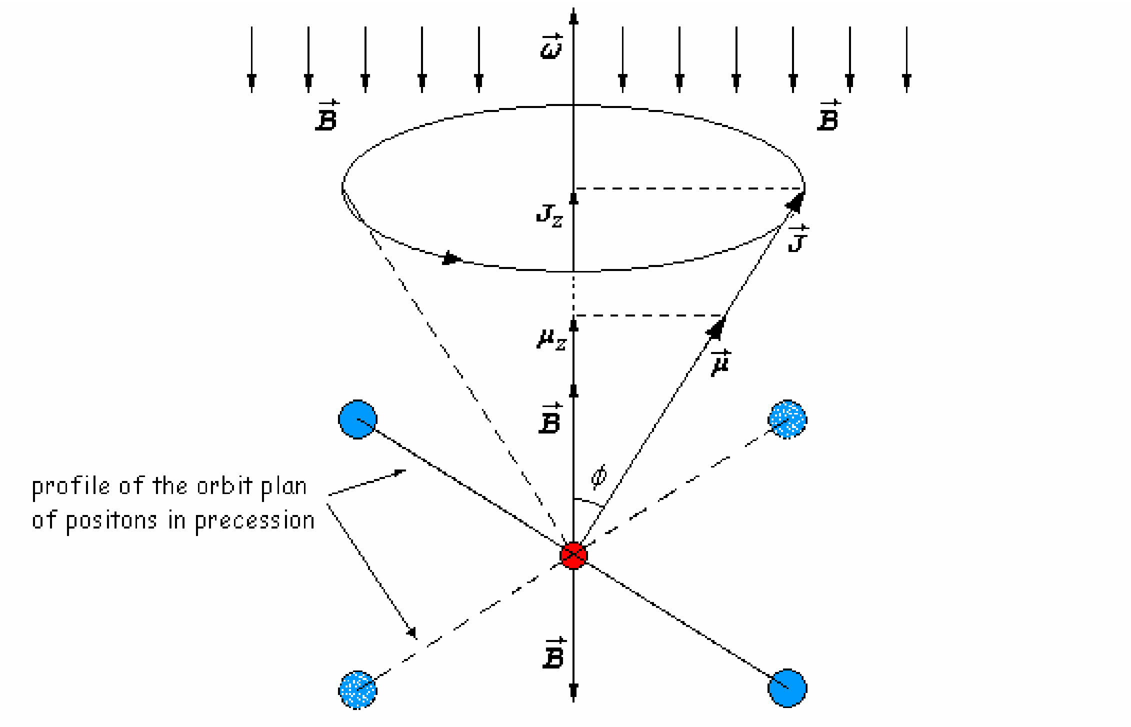

Figure 7. - Precession of the proton's orbit

According to figure 7, the proton's orbit undergoes a moment $\vec{N}$ that tends to align the magnetic moment $\vec{\mu}$ with magnetic field $\vec{B}$, this moment is:

$$\vec{N} = \vec{\mu} \wedge \vec{B} = \gamma \cdot \vec{J} \wedge \vec{B} \tag{49}$$

which makes $\vec{\mu}$ and $\vec{J}$ precess around the direction of $\vec{B}$, with an angular velocity $\vec{\omega}$ that we can calculate from the angular moment theorem: $\vec{N} = \frac{d}{dt}\vec{J}$. Indeed, as vector $\vec{J}$ has its origin fixed in the centre of the orbit (in the negaton), $\frac{d}{dt}\vec{J}$ is the velocity at the end of $\vec{J}$, that is: $\frac{d}{dt}\vec{J} = \vec{\omega} \wedge \vec{J}$, which together with (49) leads to:

$$\vec{\omega} \wedge \vec{J} = \gamma \cdot \vec{J} \wedge \vec{B} \qquad \Rightarrow \qquad (\vec{\omega} + \gamma \cdot \vec{B}) \wedge \vec{J} = 0 \tag{50}$$

and, as vector $\vec{J} \neq 0$, we finally have the Larmor precession angular frequency:

$$\vec{\omega} = -\gamma \cdot \vec{B} \tag{51}$$

which makes the orbital plane change as shown on figure 7.

In the figure we see that $\vec{\omega}$ and $\vec{B}$ take opposite directions, therefore the value of the Larmor precession angular frequency will be

$$\omega = \gamma \cdot B \qquad (52)$$

In addition, the following equalities are fulfilled:

$$J_Z = J \cdot Cos[\phi] \qquad (53)$$

$$\mu_Z = \mu \cdot Cos[\phi] \qquad (54)$$

then, by dividing both of them, we obtain:

$$\frac{J_Z}{\mu_Z} = \frac{J}{\mu} \qquad (55)$$

Finally, from (47) and (55) we obtain

$$\omega = \gamma \cdot B = \frac{\mu}{J} \cdot B = \frac{\mu_z}{J_z} \cdot B \qquad (56)$$

and from (53) and (54) we can obtain the precession angle ϕ

$$\phi = ArcCos\left[\frac{J_Z}{J}\right] = ArcCos\left[\frac{\mu_Z}{\mu}\right] \qquad (57)$$

On the other hand, the experiments on magnetic resonance imaging tell us that the Larmor precession angular frequency of the proton is

$$\omega = \frac{2 \cdot \mu_p}{\hbar} \cdot B = \frac{2 \cdot \mu_o \cdot \mu_N}{\hbar} \cdot B = \frac{\mu_o \cdot e}{m_p} \cdot B \qquad (58)$$

where $\mu_p = \mu_o \cdot \mu_N$ is the magnetic momentum of the proton and $\mu_N = \frac{e \cdot \hbar}{2 \cdot m_p}$, the nuclear magneton. Once ω is known, from (58) we obtain the value of the μ_o coefficient, which is

$$\mu_o = \frac{\omega \cdot m_p}{e \cdot B} = 2.792847356..... \qquad (59)$$

and from here, we can obtain the value of the magnetic momentum of the proton $\mu_p = \mu_o \cdot \mu_N$.

Equalling both Larmor frequencies (52) and (58), and taking into account the value obtained from γ in (48), we have that

$$\left[g_{AB} \cdot \frac{m_A + 2 \cdot m_A \cdot Sen(\theta)}{2 \cdot m_A \cdot m_B} + \frac{Sen(\theta) \cdot Cos(\theta)}{m_A} \right] \cdot e \cdot B = \frac{\mu_o}{m_p} \cdot e \cdot B \qquad (60)$$

then

$$g_{AB} \cdot \frac{m_A + 2 \cdot m_A \cdot Sen(\theta)}{2 \cdot m_A \cdot m_B} + \frac{Sen(\theta) \cdot Cos(\theta)}{m_A} = \frac{\mu_o}{m_p} \qquad (61)$$

and clearing g_{AB} we obtain

$$g_{AB} = \frac{2 \cdot m_B \cdot \left(\mu_o \cdot m_A - m_p \cdot Sen(\theta) \cdot Cos(\theta)\right)}{m_p \cdot \left(m_A + 2 \cdot m_B \cdot Sen(\theta)\right)} = 1,009640492374899.... \qquad (62)$$

If we take a closer look, this value obtained for g_{AB} that links the relationship existing between active mass and passive mass according to (11), only depends on the masses of the tons, on the orientation of the angular momenta of spin **S** of the positons (θ angle) and on the μ_o coefficient, and does not depend at all on the numerical value α, which is still unknown to us, to be able to calculate the values of momenta S, J and L.

From (56) and (58) we obtain the following relationship

$$\omega = \gamma \cdot B = \frac{\mu}{J} \cdot B = \frac{\mu_Z}{J_Z} \cdot B = \frac{2 \cdot \mu_p}{\hbar} \cdot B = \frac{\mu_p}{\hbar/2} \cdot B \qquad (63)$$

and we can ask ourselves if the calculated magnetic momentum μ_p of the proton is really the momentum μ or only its component μ_Z. The interpretation of Aspin Bubbles is the second option, that is, $\mu_Z = \mu_p$, and consequently $J_Z = \hbar/2$. We will show this below in the resolution.

Usually, the Larmor precession frequency is measured in Hz and is named by ω_P, and therefore it can be expressed as:

$$\omega_P = \frac{\omega}{2 \cdot \pi} = \frac{\mu_Z}{\pi \cdot \hbar} \cdot B = \frac{\mu_p}{\pi \cdot \hbar} \cdot B \qquad (64)$$

3.6 - Resolution

We know that the proton is very stable, meaning that there must be a very strong union between tons. To this end, we have numerically searched a value for α so that its orbital radius is minimum. We will name it "α limit", and we will see the reason why below. This is achieved when the quotient

$$\frac{r}{R_{MA} + R_{MB}} \cong 1 \qquad (65)$$

that is, when the sizes of the positon and negaton are maximum, and they fit at least in the orbital diameter. It is to be taken into consideration that this fact occurs every certain time as the pulsation frequencies of the tons are different.

The process is as follows: A value is given to α, which implies a direct value of n in accordance with (41) and the equation (28) is numerically solved, which provides the value of the unknown x. With this data, the rest is then calculated. The results are the following:

$\alpha = 0,51714564051....$ "α limit"

$n = -0,1162258304671.....$

$x = 3,0030120231661....$

$r = x \cdot R_{A1} = 1,79393481341941.... \cdot 10^{-15}$ m as $x = r/R_{A1}$

which implies that the relationship (65) takes a value very close to one:

$$\frac{r}{R_{MA} + R_{MB}} = 1,000000000001123..... \qquad (66)$$

It is not necessary to calculate any more decimals. Thus, using (25) the binding force is:

$$F_{BINDING} = F_A = 80,62923351823.... \text{ N} \qquad (67)$$

From (63) and (39), if $\mu = \mu_p$ we would have:

$$\omega = \gamma \cdot B = \frac{\mu}{J} \cdot B = \frac{2 \cdot \mu_p}{\hbar} \cdot B = \frac{\mu_p}{\hbar / 2} \cdot B \quad \Rightarrow \quad J = \hbar / 2 = \alpha \cdot \hbar \quad \Rightarrow \quad \alpha = 1/2$$

This value of α is not possible because $\frac{r}{R_{MA} + R_{MB}} < 1$ and therefore, the positons would not be able to orbit around the negaton. In addition, from (63), we would have that $J = J_Z$ and due to (57), $\phi = 0$. Consequently, we would not have any precession.

Quantum mechanics indicate that the magnitude of a spin angular momentum $\vec{S}$ with quantum number $s = 1/2$ is $S = \sqrt{s \cdot (s+1)} \cdot \hbar = \sqrt{3} \cdot \hbar / 2$. And, according to (39), $J = S = \alpha \cdot \hbar$, therefore the value of α should be $\alpha = \sqrt{3} / 2$

The sizes of the tons do not change with α, they do not depend on its value. Any value included between "α limit" and the one proposed by quantum mechanics could be correct. The most important differences are shown on the following Table I.

	"α limit"	$\alpha = \sqrt{3} / 2$
α	$0,51714564051....$	$0,8660254037.....$
$n = -\alpha \cdot Sen(\theta)$	$-0,1162258304671.....$	$-0,1946347679953....$
$x = r / R_{A1}$	$3,0030120231661....$	$9,6103866927699....$
radius r orbit in m	$1,79393481341941.... \cdot 10^{-15}$	$5,7410383726687... \cdot 10^{-15}$
$\frac{r}{R_{MA} + R_{MB}}$	$1,000000000001123.....$	$3,2002491560617....$
$\frac{\mu}{\mu_N} = 2 \cdot \mu_o \cdot \alpha$	$2,88861766953....$	$4,8373535183....$
$J_Z / \hbar$	$1/2$	$1/2$
$\frac{J}{J_Z} = \frac{\mu}{\mu_Z} = 2 \cdot \alpha$	$1,03429128102$	$\sqrt{3} = 1,7320508075....$
ω_P in *MHz* with $B = 1$ T	$42,57748059....$	$42,57748059....$
angle ϕ	$14,795011...^o$	$54,735610...^o$
Binding force in N	$80,62923351823.....$	$7,076346884....$

TABLE I .- Comparisons of α values in the proton

As expected, both values obtained for $J_Z / \hbar$ and ω_P are the same and they do not depend on the value given to α. All the other values are different. It is difficult to make an analysis of the table without including the size of the tons. For the "α limit" value, we provide below the essential characteristics and dimensions of the proton, changing for different energetic statuses according to the excitement factor τ that tons can have (see 12). The values α, n, μ, μ_Z, J, J_Z, ω_P and ϕ are constant regardless of the value of factor τ.

factor τ	1	10^3	10^6	10^9
Energy in MeV	$9,382720 \cdot 10^2$	$9,382720 \cdot 10^5$	$9,382720 \cdot 10^8$	$9,382720 \cdot 10^{11}$
Positon diameter	in meters			
maximum $2 \cdot R_{MA}$	$2,39411 \cdot 10^{-15}$	$7,55676 \cdot 10^{-17}$	$2,38951 \cdot 10^{-18}$	$7,55630 \cdot 10^{-20}$
balance $2 \cdot R_{A1}$	$1,19475 \cdot 10^{-15}$	$3,77815 \cdot 10^{-17}$	$1,19475 \cdot 10^{-18}$	$3,77815 \cdot 10^{-20}$
minimum $2 \cdot R_{mA}$	$2,50091 \cdot 10^{-20}$	$7,46297 \cdot 10^{-25}$	$2,35252 \cdot 10^{-29}$	$7,43835 \cdot 10^{-34}$
Negaton diameter	in meters			
maximum $2 \cdot R_{MB}$	$1,19375 \cdot 10^{-15}$	$3,78204 \cdot 10^{-17}$	$1,19605 \cdot 10^{-18}$	$3,78227 \cdot 10^{-20}$
balance $2 \cdot R_{B1}$	$5,98029 \cdot 10^{-16}$	$1,89113 \cdot 10^{-17}$	$5,98029 \cdot 10^{-19}$	$1,89113 \cdot 10^{-20}$
minimum $2 \cdot R_{mB}$	$1,10645 \cdot 10^{-20}$	$3,71081 \cdot 1^{-25}$	$1,17719 \cdot 10^{-29}$	$3,72305 \cdot 10^{-34}$
Changing	characteristics			
$x = r / R_{A1}$	$3,003012.....$	$109,841219...$	$3473,84387...$	$109852,000...$
Diameter orbit $2 \cdot r$	$3,58786 \cdot 10^{-15}$	$4,14996 \cdot 10^{-15}$	$4,15039 \cdot 10^{-15}$	$4,15039 \cdot 10^{-15}$
Diameter $2(r + R_{MA})$	$5,98198 \cdot 10^{-15}$	$4,22553 \cdot 10^{-15}$	$4,15278 \cdot 10^{-15}$	$4,15047 \cdot 10^{-15}$
(a) $\frac{r}{R_{MA} + R_{MB}}$	$1,0000000....$	$36,599701...$	$1157,52671...$	$36604,2351...$
(b) $\frac{r}{R_{A1} + R_{B1}}$	$2,001280...$	$73,200887...$	$2315,05491...$	$73208,4718...$
(c) $\frac{r}{R_{mA} + R_{mB}}$	$9,94594... \cdot 10^4$	$3,71402... \cdot 10^9$	$1,17584... \cdot 10^{14}$	$3,7185... \cdot 10^{18}$
Binding force in N	$80,629233...$	$53,588091...$	$53,572563...$	$53,572547...$

TABLE II .- Results of the proton for "α limit"

Analysing Table II, we observe that the sizes of the tons for $\tau = 1$ are completely compatible with the latest measurements obtained for the proton (diameter = $1,6836...\cdot 10^{-15}$ m). Possibly we are measuring the real size of the tons, because as factor τ increases we have the following:

1.- The size of the tons decreases, specially their minimum diameters decrease drastically, $2\cdot R_{mA} = 7,43835\cdot 10^{-34}$ m and $2\cdot R_{mB} = 3,72305\cdot 10^{-34}$ m for a proton energy of $9,382720\cdot 10^{11}$ MeV.

2.- The orbital diameter increases slightly and tends to stabilize at $4,15039...\cdot 10^{-15}$ m

3.- As a result of 1 and 2, the tons leave much empty space between each other, see relationships a, b and c. Consequently, it can be said that the proton is empty inside.

4.- The binding force decreases slightly and becomes stable at $53,572547...$ N

For the value $\alpha = \sqrt{3}/2$, given by quantum mechanics, the orbital diameter ($2\cdot r = 1,148207...\cdot 10^{-14}$ m) is too big and the binding force ($7,076346...$N) is very weak. The positon as a mechanical machine may possibly need a small tolerance in its dimensions to be able to operate, achieving this with a value α close to "α limit", compatible with a slight modification of quantum mechanics parameters. To this end, it would suffice to say that the magnitude of the spin angular momentum $\vec{S}$ for a quantum number $s = 1/2$ is:

$$S = \frac{3}{5}\cdot\sqrt{s\cdot(s+1)}\cdot\hbar = \frac{3}{5}\cdot\frac{\sqrt{3}}{2}\cdot\hbar = \frac{3\cdot\sqrt{3}}{10}\cdot\hbar = \alpha\cdot\hbar \qquad (68)$$

$$\Rightarrow \quad \alpha = \frac{3\cdot\sqrt{3}}{10} = 0,519615... \text{ and } \frac{\alpha}{\alpha\,\text{lim.}} = 1,004775... \qquad (69)$$

For this value α and $\tau = 1$ we obtain the following:

$$n = -0,116780... \qquad (70)$$

$$x = 3,044279... \qquad (71)$$

$$2\cdot r = 2\cdot x\cdot R_{A1} = 3,637173...\cdot 10^{-15} \text{ m} \qquad (72)$$

$$\frac{r}{R_{MA} + R_{MB}} = 1,013741... \qquad (73)$$

$$\phi = 15,793169...^{\circ} \qquad (74)$$

$$F_{BINDING} = F_A = 78,195478.... \text{ N} \qquad (75)$$

For high values of τ, the orbital diameter becomes stable at $4,190134\cdot 10^{-15}$ m and the binding force at $52,561317$ N. As we can see, these are not remarkable changes; nevertheless we provide continuity to quantum mechanics.

4. - The antiproton

To be able to build the antiproton it is enough to exchange the tons and reverse their angular momenta.

When we speak of exchanging the tons it means that two negatons with a mass m_B are going to be orbiting around a positon with a mass m_A, and as we have done in the case of the proton, we have to calculate the value of these masses.

In the decay of the antineutron in antiproton plus positron plus neutrino,

$$\bar{n} = \bar{p} + e^+ + \nu_e \qquad (76)$$

we consider that the antineutron and the neutrino, as they are neutral particles, have the same amount of both positonic and negatonic mass. Applying the mass conservation law we shall obtain:

for the negatonic mass B $\rightarrow$ $$\frac{m_{an}}{2} = 2 \cdot m_B + \frac{m_\nu}{2} \qquad (77)$$

and for the positonic mass A $\rightarrow$ $$\frac{m_{an}}{2} = m_A + m_{e+} + \frac{m_\nu}{2} \qquad (78)$$

subtracting both ecuations $\Rightarrow$ $$0 = 2 \cdot m_B - m_A - m_{e+} \qquad (79)$$

and taking into account the structure defined for the antiproton, its mass is:

$$m_{ap} = 2 \cdot m_B + m_A \qquad (80)$$

thus, resolving the system of equations (79) and (80) we finally obtain that:

the mass of the negatons is $\rightarrow$ $$m_B = \frac{m_{ap} + m_{e+}}{4} = \frac{m_p + m_e}{4} \qquad (81)$$

and the mass of the positon is $\rightarrow$ $$m_A = \frac{m_{ap} - m_{e+}}{2} = \frac{m_p - m_e}{2} \qquad (82)$$

taking into account that the masses of the particle and the antiparticle are the same.

Note that, in addition, the mass of the positon is almost double the mass of the negatons

$$\frac{m_A}{m_B} = 2 \cdot \frac{m_p - m_e}{m_p + m_e} \cong 2 \qquad (83)$$

If we compare these results with those for the proton (22, 23 and 24) we can see that they are identical except for the fact that the masses are also exchanged.

Conclusion: To be able to build an antiparticle we have to exchange positons for negatons, negatons for positons, and also exchange the value or their masses

Let us see now in more detail the reversal of the angular momenta or, in other words, let us rotate 180° all the particle momenta.

Let us first consider the case of the electron and the positron in the following figure:

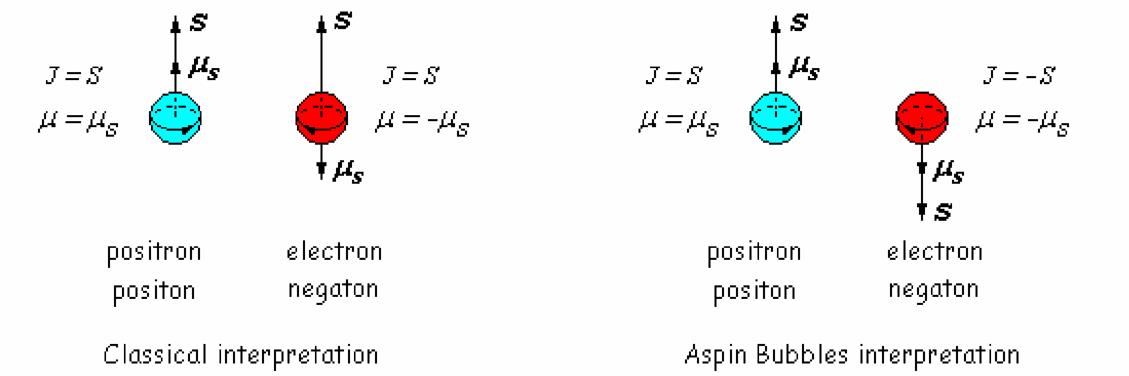

Figure 8. - Momenta of positron and electron

In Aspin Bubbles there are no electrical charges or distant forces; everything is mechanics, and according to (1), (2) and (3), the angular and magnetic momenta of the positron are positive and those of the electron (antiparticle) are negative, as it is shown in Figure 8. This can be generalized as follows: If a particle has an angular momentum J, its antiparticle will always have a momentum $-J$. And for the magnetic momenta we will have the same situation: If a particle has a magnetic momentum μ, its antiparticle will have a momentum $-\mu$.

Taking this into account, the angular momentum of the antiproton will be $J=-S$ and its total magnetic momentum will also be negative.

Therefore, the equation for angular momenta will be

$$J = -S = 2L_B - S_A - 2S_B \cdot Sen(\theta) \qquad (84)$$

and as $S = S_A = S_B = \alpha \cdot \hbar$, we will have

$$L_B = S_B \cdot Sen(\theta) = S \cdot Sen(\theta) \text{ and } n = \alpha \cdot Sen(\theta) \qquad (85)$$

therefore, the orbital angular momentum is positive and the negatons spin clockwise, as opposed to the proton.

For the magnetic momenta we will obtain the following equation:

$$\mu = -\mu_{SA} - 2 \cdot \mu_{SB} \cdot Sen(\theta) + 2 \cdot \mu_{LB} \qquad (86)$$

but the value of the magnetic momentum produced by negatons in the loop according to (3) is

$$\mu_{LB} = \frac{e \cdot L_B}{2 \cdot m_B} \cdot (\hat{s} \cdot \hat{v}) = \frac{e \cdot L_B}{2 \cdot m_B} \cdot Cos(180^\circ - \theta) = -\frac{e \cdot L_B}{2 \cdot m_B} \cdot Cos(\theta) \qquad (87)$$

therefore, the total magnetic momentum of the antiproton will be

$$\mu = -\frac{g_{AB}}{2} \cdot \frac{e \cdot S}{m_A} - g_{AB} \cdot \frac{e \cdot S}{m_B} \cdot Sen(\theta) - \frac{e \cdot L_B}{m_B} \cdot Cos(\theta) \qquad (88)$$

which is the same value as that of the proton but a negative one.

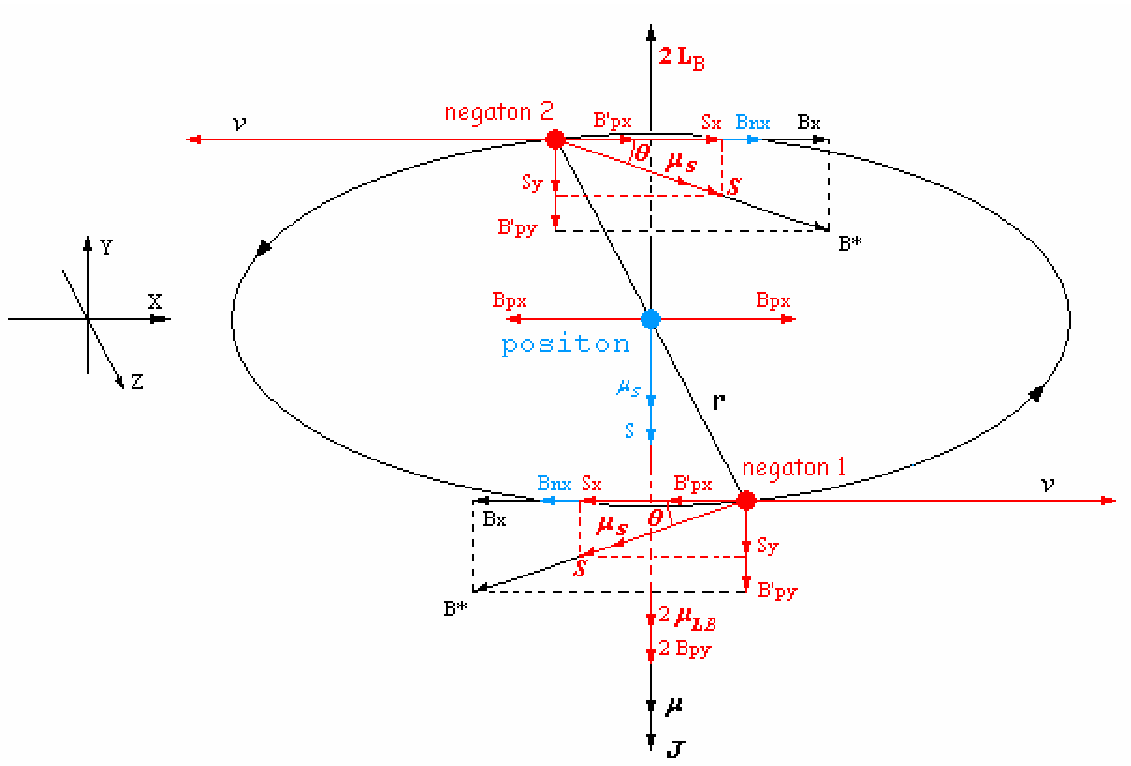

Figure 9. - Alignement of fields B with spin angular momenta S in the Antiproton

The B^* fields also penetrate by the base of the **S** vectors of the negatons and form the same angle θ with the trajectory of the orbit and an angle $180^\circ - \theta$ with the speed vector v. This is the reason why magnetic momenta μ_{LB} are negative, as obtained in (87).

As with the proton, the μ_Z component will be negative and its value will be $\mu_Z = \mu_{ap} = -\mu_o \cdot \mu_N = -\mu_p$. As J is negative, its component J_Z will also be negative, its value being $J_Z = -\hbar/2$. Therefore, the precession angle ϕ according to (57) will be the same and the Larmor precession angular frequency will also be that of the proton.

It can be verified that the gyromagnetic coefficient has the same value (62) and can be expressed as

$$g_{AB} = \frac{2 \cdot m_A \cdot \left(\mu_o \cdot m_B - m_{ap} \cdot Sen(\theta) \cdot Cos(\theta)\right)}{m_{ap} \cdot \left(m_B + 2 \cdot m_A \cdot Sen(\theta)\right)} = 1{,}009640492374899.... \quad (88^*)$$

As for the existing binding forces, we will have:

.- The attraction force that positon A exerts over negatons B

$$F_A = F_{AB} = \delta_A \cdot \delta_B \cdot \frac{Aspin_A}{Aspin_B} \cdot \frac{k \cdot e^2}{r^2 - R_{B1}^2} = -\frac{Aspin_A}{Aspin_B} \cdot \frac{k \cdot e^2}{(x^2 - 1) \cdot R_{B1}^2} \quad (89)$$

where we change the variable $x = r/R_{B1}$

.- The repulsion force that negatons B exert among each other

$$F_R = F_{BB} = \delta_B \cdot \delta_B \cdot \frac{Aspin_B}{Aspin_B} \cdot \frac{k \cdot e^2}{(2r)^2 - R_{B1}^2} = \frac{k \cdot e^2}{(4x^2 - 1) \cdot R_{B1}^2} \quad (90)$$

.- And the centrifugal force due to the orbital movement of the negatons

$$F_C = \frac{L_B^2}{m_B \cdot r^3} = \frac{n^2 \cdot \hbar^2}{m_B \cdot r^3} \qquad (91)$$

Finally, simplifying $-F_A = F_R + F_C$, we obtain the equation (92)

$$\frac{Aspín_A}{Aspín_B} \cdot x^3 \cdot (4x^2 - 1) - x^3 \cdot (x^2 - 1) - \alpha_0 \cdot (x^2 - 1) \cdot (4x^2 - 1) = 0 \text{ with } \alpha_0 = \frac{n^2 \cdot \hbar^2}{m_B \cdot R_{B1} \cdot k \cdot e^2}$$

factor τ	1	10^3	10^6	10^9
Energy in MeV	$9,382720 \cdot 10^2$	$9,382720 \cdot 10^5$	$9,382720 \cdot 10^8$	$9,382720 \cdot 10^{11}$
Positon diameter	in meters			
maximum $2 \cdot R_{MA}$	$1,19836 \cdot 10^{-15}$	$3,78250 \cdot 10^{-17}$	$1,19606 \cdot 10^{-18}$	$3,78227 \cdot 10^{-20}$
balance $2 \cdot R_{A1}$	$5,98029 \cdot 10^{-16}$	$1,89113 \cdot 10^{-17}$	$5,98029 \cdot 10^{-19}$	$1,89113 \cdot 10^{-20}$
minimum $2 \cdot R_{mA}$	$1,25182 \cdot 10^{-20}$	$3,73555 \cdot 10^{-25}$	$1,17754 \cdot 10^{-29}$	$3,72327 \cdot 10^{-34}$
Negaton diameter	in meters			
maximum $2 \cdot R_{MB}$	$2,38491 \cdot 10^{-15}$	$7,55584 \cdot 10^{-17}$	$2,38950 \cdot 10^{-18}$	$7,55630 \cdot 10^{-20}$
balance $2 \cdot R_{B1}$	$1,19475 \cdot 10^{-15}$	$3,77815 \cdot 10^{-17}$	$1,19475 \cdot 10^{-18}$	$3,77815 \cdot 10^{-20}$
minimum $2 \cdot R_{mB}$	$2,21049 \cdot 10^{-20}$	$7,41355 \cdot 1^{-25}$	$2,35182 \cdot 10^{-29}$	$7,43809 \cdot 10^{-34}$
Changing	characteristics			
$x = r/R_{B1}$	3,003012.....	109,841219...	3473,84387...	109852,600...
Diameter orbit $2 \cdot r$	$3,58786 \cdot 10^{-15}$	$4,14996 \cdot 10^{-15}$	$4,15039 \cdot 10^{-15}$	$4,15039 \cdot 10^{-15}$
Diameter $2(r + R_{MB})$	$5,97278 \cdot 10^{-15}$	$4,22552 \cdot 10^{-15}$	$4,15278 \cdot 10^{-15}$	$4,15047 \cdot 10^{-15}$
(a) $\frac{r}{R_{MA} + R_{MB}}$	1,0012825....	36,601185...	1157,52819...	36604,2366...
(b) $\frac{r}{R_{A1} + R_{B1}}$	2,001280...	73,200887...	2315,05491...	73208,4718...
(c) $\frac{r}{R_{mA} + R_{mB}}$	$1,03626... \cdot 10^5$	$3,72224... \cdot 10^9$	$1,17596... \cdot 10^{14}$	$3,7185... \cdot 10^{18}$
Binding force in N	80,629233...	53,588091...	53,572563...	53,572547...

TABLE III .- Results of the antiproton for "α limit"

Comparing Tables II and III for the "α limit" value it can be seen that the sizes of the orbital positons of the proton are practically the same as the orbital negatons of the antiproton, and the size of the central negaton of the proton is also comparable to that of the central positon of the antiproton. All the other findings are very similar. Also in the antiproton, for high τ values, the orbital diameter becomes stable at $4{,}15039...\cdot 10^{-15}$ m and the binding force at $53{,}572547...$ N. Proton and antiproton are practically equal. There is only one important finding in the antiproton, which is the following:

$$\frac{r}{R_{MA}+R_{MB}}=1{,}0012825... \qquad (93)$$

which means that negatons have a little more room to orbit around the central positon. We must not forget that for the proton this value was $1{,}000000000001123.....$, which is the reason why we think again in the "quantum" α that we proposed for the proton.

For this value $\alpha=\frac{3\cdot\sqrt{3}}{10}=0{,}519615...$ and $\tau=1$ we obtain the following:

$$n=-0{,}116780... \qquad (94)$$

$$x=3{,}044279... \qquad (95)$$

$$2\cdot r=2\cdot x\cdot R_{A1}=3{,}637173...\cdot 10^{-15}\ \text{m} \qquad (96)$$

$$\frac{r}{R_{MA}+R_{MB}}=1{,}015042... \qquad (97)$$

$$\phi=15{,}793169...^{\circ} \qquad (98)$$

$$F_{BINDING}=F_A=78{,}195478....\ \text{N} \qquad (99)$$

where all the values are practically the same as those for the proton except for (97), which differs very little from (73). In addition, for high values of τ, the orbital diameter of this antiproton also becomes stable at $4{,}190134\cdot 10^{-15}$ m and its binding force at $52{,}561317$ N. As we can see, these are not remarkable changes; nevertheless we would give room to the orbiting tons and, in doing so, we would also provide continuity to quantum mechanics.

5. - Conclusions and predictions

We believe that we have found the structures of both the proton and the antiproton that meet the knowledge we have of them up until today. And they are simply structures formed by two tons in a circular orbit around the opposite ton.

Indeed, seen without prejudices, the proton is a simple mechanical machine very difficult to destroy. It is very stable, and as we excite it (increasing its energy) it is even more difficult to destroy, because although its binding force decreases slightly, the size of its tons decreases considerably and therefore, the space between them increases largely. This implies for a projectile to pass through it easily without disturbing it. We believe that it would be easier to destroy a proton when it is not excited and recompose it to obtain other particles from it. We are considering fusion. To achieve cold fusion we have to deceive the proton. In subsequent articles we will go deeper into this possibility. The same can be said for the antiproton.

The neutron's structure is already solved by this approach and will be published shortly. The importance of this particle will help us prove that protons are basic in the construction of matter. As we progress in Aspin Bubbles[1], all particles, nuclei and atoms are formed by bound tons. It is our planetary system in small.

We will see that the neutron provides the key to understanding what the dark matter actually is and the reason why it is an unstable particle. In this article we will also see the construction of the photon.

We will gradually construct and publish the world of Aspin Bubbles that suits reality. Relativity, as we have already mentioned, is also completed and we will publish it soon, after the neutron. Below we will construct the rest of matter (neutrino, alpha particle, nuclei and atoms) step by step as well as permitted antimatter.

We say “permitted antimatter” because with Aspin Bubbles it is not possible to construct anti-molecules. Therefore, antimatter worlds do not exist.

Antigravity can not exist either. The force between neutral matters, between these and antiatoms or between antiatoms is always the force of gravity.

Dark energy exists and it is a consequence of the weak force existing between the neutral matter and the non-neutral matter (more positons than negatons or the opposite), a force not yet discovered. Its value should be between the force of gravity and the electrical force (in the order of 10^{19} times the force of gravity or 10^{19} times less than the electrical force). In Aspin Bubbles[1] we said the following:

1.- *Neutral matter repels positive matter (positrons, positive ions, etc.) and positive matter, in turn , attracts neutral matter.*

This perfectly explains the accelerated expansion of our universe and dark energy. We will find the latter in the confines of our universe as positive matter. It is also the cause for the Brownian motion of atmospheric particles; the positive ions are slightly repelled from the Earth's surface.

2.- *Neutral matter attracts negative matter (electrons, negative ions, etc.) and negative matter, in turn , repels neutral matter.*

This is why neutrinos can cleanly cross matter. The cortical electrons of the atoms repel the neutrinos, formed by a positon and a negaton (neutral matter). It also helps the electrons to always be on the surface of materials and conductors.

Aspin Bubbles is not a model, it is not a theory, and it is not a coincidence or a manipulation to obtain certain results. It has a mathematical backup in all what it achieves, its mechanical engineering is initially simple: Only two substances, A and B, forming the ether that fills the space. Two substances transforming into tons with the help of energy: positon A and negaton B, and these (pulsatory bubbles) with the anharmonic vibration of their membranes produce anharmonic spherical waves supported by the ether, and one single mechanical interaction between the waves and the tons. Tons self-propel themselves in this field of waves. There is nothing more, everything we know is then constructed as from here. Let's recall some other important results not mentioned before:

1.- It unifies all known forces. It really obtains them with mathematical support and gives mechanical sense to all of them: Electrical, magnetic, gravity, Casimir, nuclear forces, etc.

2.- It gives sense to the project *La transformada de "Aspin Bubbles", ensayo de un complemento a la transformada de Galileo*[4].

3.- Permitted antimatter is constructed interchanging positons for negatons and vice versa.

4.- It obtains the precession of the planets' perihelion (it will be published with the Relativity paper).

5.- It corroborates results from Quantum Mechanics and it agrees with the principle of uncertainty. Tons are very difficult to locate due to the pulsation of their membrane, which constantly changes its size. See examples on the last tables (negaton sizes $2 \cdot R_{MB} = 1{,}19605 \cdot 10^{-18}$ m and $2 \cdot R_{mB} = 1{,}17719 \cdot 10^{-29}$ m for a proton energy of $9{,}382720 \cdot 10^{8}$ MeV).

6.- Due to the variability in size of the tons, an excited electron can perfectly overcome the Penning trap ($R_{mB} \ll 10^{-22}$ m).

As we mentioned at the beginning, Aspin Bubbles is not a model; a model or a theory would fail straight away when trying to explain the entire known physical phenomena. There is no theory or model that can cover it all, it has to stick to its field of action. Nevertheless, Aspin Bubbles slowly demonstrates that it is possible; this is why we are convinced of its future potential.

As we have seen, proton and antiproton are not a manipulation, but a perfect work of engineering and they show us how to structure all the matter, which means a lot of effort.

To check all the results of the proton and the antiproton, we attach herewith ANNEXES I and II, copies of the programme MATHEMATICA, which has been of great assistance in attaining Aspin Bubbles.

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ANNEX I

Mars 2014

The Aspin Bubbles proton (V2). Calculus

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Instructions:

1.- Enter values η and factor τ in "**Data In:**"

2.- Click on **Kernel/Evaluation/Evaluation Notebook** and wait 20 seconds

3.- Repeat, Click on **Kernel/Evaluation/Evaluation Notebook**

4.- If is necessary more precision, change quantity of "**digits**"

---

significant digits

digits = 70;

pi = N[Pi, digits]

3.141592653589793238462643383279502884197169399375105820974944592307816

ζ = N[1, digits]

1.000000000000000000000000000000000000000000000000000000000000000000000

Mass of the electron in kg

$$m_\circ = \frac{910938291}{100000000} * 10^{-31} * \zeta$$

$9.109382910000000000000000000000000000000000000000000000000000000000000 \times 10^{-31}$

mo = $m_\circ$

$9.109382910000000000000000000000000000000000000000000000000000000000000 \times 10^{-31}$

Mass of the proton in kg

$$m_p = \frac{1672621777}{1000000000} * 10^{-27} * \zeta$$

$1.672621777000000000000000000000000000000000000000000000000000000000000 \times 10^{-27}$

mp = m_p

$1.672621777000000000000000000000000000000000000000000000000000000000000 \times 10^{-27}$

Mass of the neutron in kg

$$m_n = \frac{1674927351}{1000000000} * 10^{-27} * \zeta$$

$1.674927351000000000000000000000000000000000000000000000000000000000000 \times 10^{-27}$

mn = m_n

$1.674927351000000000000000000000000000000000000000000000000000000000000 \times 10^{-27}$

Mass of the proton / 4 times mass of the electron

$$p_\circ = \frac{m_p}{4 * m_\circ}$$

459.0381679871661032196087583280654957120470853058036617323401108407243

electric charge of the electron in C

$$e = \frac{1602176565}{1000000000} * 10^{-19} * \zeta$$

$1.602176565000000000000000000000000000000000000000000000000000000000 \times 10^{-19}$

Planck constant

$$h = \frac{662606957}{100000000} * 10^{-34} * \zeta$$

$6.626069570000000000000000000000000000000000000000000000000000000000 \times 10^{-34}$

reduced Planck constant

$$\hbar = \frac{h}{2 * pi}$$

$1.054571725336289397963133257349697988664496350033818592957183196951376 \times 10^{-34}$

speed of light in m/s

$$c = \frac{299792458}{100000000} * 10^{8} * \zeta$$

$2.997924580000000000000000000000000000000000000000000000000000000000 \times 10^{8}$

Gravitational constant

$$G = \frac{667384}{100000} * 10^{-11} * \zeta$$

$6.673840000000000000000000000000000000000000000000000000000000000000 \times 10^{-11}$

Coulomb constant

$$k = c^{2} * 10^{-7}$$

$8.98755178736817640000000000000000000000000000000000000000000000000 \times 10^{9}$

Data In:

Info: ($\eta = \frac{\text{mass ton}}{\text{mass electron}}$)

POSITON A

$\eta_A = p_o + \frac{1}{4};$ $\delta_A = 1 * \zeta;$

NEGATON B

$\eta_B = 2 * p_o - \frac{1}{2};$ $\delta_B = -1 * \zeta;$

factor τ (excited energy)

$$\tau = \frac{10^{0}}{1} * \zeta$$

1.000000000000000000000000000000000000000000000000000000000000000000

$\tau_A = \tau$

1.000000000000000000000000000000000000000000000000000000000000000000

$\tau_B = \tau$

1.000000000000000000000000000000000000000000000000000000000000000000

---

large distance **d** in m between the two tons

$d = 1 * \zeta;$

Electric force between two charges **e** separated by a distance **d**

$$F_E = \frac{k * e^2}{d^2}$$

$2.30707735237061575671330131589432900000000000000000000000000000000000 \times 10^{-28}$

Active mass m of the tons

$$m_A = \eta_A * m_o$$

$4.18383178822750000000000000000000000000000000000000000000000000000000 \times 10^{-28}$

$$m_B = \eta_B * m_o$$

$8.35855419354500000000000000000000000000000000000000000000000000000000 \times 10^{-28}$

Verification mass of the proton

$$\frac{2 * m_A + m_B}{mp}$$

1.000000000000000000000000000000000000000000000000000000000000000000000

$$\frac{m_B}{mp}$$

0.499727691489036496025484905545385590181754521064088716573011592446820

$$\frac{m_A}{mp}$$

0.250136154255481751987257547227307204909122739467955641713494203776590

$$\frac{m_B}{m_A}$$

1.99782271769729556147343494961867562275946627895887611185597112838628

New GYROMAGNETIC coefficient gAB

angle θ according to (37)

$$\theta = \text{ArcSin}\left[-1 * \zeta + \frac{\sqrt{6}}{2} * \zeta\right]$$

0.22668120151537757708289958479840582314185576662570313271707353696499 2

$$\frac{180}{pi} * \theta$$

12.9878761417856557307483814352015712605614985064732264677528883827618

nuclear magneton

$$\mu N = \frac{e * \hbar}{2 * m_p}$$

$5.05078352942375811681928986058454303882321059709669530117947569496243 \times 10^{-27}$

coefficient of the magnetic moment of the proton

$$\mu o = \frac{2792847356}{1000000000} * \zeta$$

2.79284735600000000000000000000000000000000000000000000000000000000000

the magnetic moment of the proton (component z)

$$\mu z = \mu o * \mu N$$

$1.41060674258794910601422928169311496404456090675326867482367223761420 9 \times 10^{-26}$

GIROMAGNETIC coefficient gAB

$$gAB = \frac{2 * m_B * (\mu o * m_A - mp * \text{Sin}[\theta]\,\text{Cos}[\theta])}{mp * (m_A + 2 * m_B * \text{Sin}[\theta])}$$

1.00964049237489984638701758091843804939998195588514615291983811475577

Passive mass M of the membrane of the tons

$$M_A = \frac{m_A}{gAB}$$

$4.1438827184775380476687083645165084708749739281761296115527542197659 \times 10^{-28}$

$$M_B = \frac{m_B}{gAB}$$

$8.2787430344476521927252333255751078905577624952179934128722749121171 \times 10^{-28}$

Aspin of the positon A:

$$HA = \frac{G * m_A{}^2}{k * e^2}$$

$5.06363117840849258720359000488372701369703018544279587571389096296972 \times 10^{-38}$

$$Aspin_A = \sqrt{1 + HA} + \delta_A * \sqrt{HA}$$

$1.000000000000000000225025135893937248575157034344400369843690412419589121995282130225628$

Aspin of the negaton B:

$$HB = \frac{G * m_B{}^2}{k * e^2}$$

$2.02104488998637199826848966176999880633573750787133451383033482706435 \times 10^{-37}$

$$Aspin_B = \sqrt{1 + HB} + \delta_B * \sqrt{HB}$$

$0.9999999999999999995504396714581710338969098523361580173065490483666954825602197637464867$

Energy of the tons

$$E_{mA} = \tau_A * m_A * c^2$$

$3.76024048663318613135376633310000000000000000000000000000000000000000 \times 10^{-11}$

Energy positon **A** in eV

$$\frac{E_{mA}}{e}$$

$2.34695761302262346556901881354131527944299946741512849428052893783277 \times 10^{8}$

$$E_{mB} = \tau_B * m_B * c^2$$

$7.51229386820091310070993013380000000000000000000000000000000000000000 \times 10^{-11}$

Energy negaton **B** in eV

$$\frac{E_{mB}}{e}$$

$4.68880523676921532097801601148747298023298699291610222747203895096294 \times 10^{8}$

Energy proton

$$E_{mB} + 2 * E_{mA}$$

$1.503277484146728536341746280000000000000000000000000000000000000000000 \times 10^{-10}$

Energy proton in eV

$$\frac{E_{mB} + 2 * E_{mA}}{e}$$

$9.38272046281446225211605363857010353911898592774635921603309682662847 \times 10^{8}$

Verification Energy proton

$$\frac{E_{mB} + 2 * E_{mA}}{\tau_A * m_p * c^2}$$

$1.000000000000000000000000000000000000000000000000000000000000000000000$

maximum velocity of the membrane of the positon A

$$v_{HA} = \sqrt{\frac{2 * E_{mA}}{M_A}}$$

4.26009300645967512194094872770989852201487955259445776816762639846376 × 10^8

$$\frac{v_{HA}}{c}$$

1.42101406915969684665681240310251518135752419515318753221190988015574

maximum velocity of the membrane of the negaton B

$$v_{HB} = \sqrt{\frac{2 * E_{mB}}{M_B}}$$

4.26009300645967512194094872770989852201487955259445776816762639846376 × 10^8

$$\frac{v_{HB}}{c}$$

1.42101406915969684665681240310251518135752419515318753221190988015574

---

frequency of the membranes in Hz

$$\nu_A = \frac{2 * E_{mA}}{h}$$

1.13498370245248907984338182344197753420207448863233109700054054820314 8 × 10^23

$$\nu_B = \frac{2 * E_{mB}}{h}$$

2.26749622497577039497034140974164266132207241524631320766527961462379 × 10^23

angular frequency of the membranes in rad/s

$$\omega_A = 2 * pi * \nu_A$$

7.13131292313776697654094700565848930956006713706417684318969701123605 × 10^23

$$\omega_B = 2 * pi * \nu_B$$

1.42470989648529386351680218872727900606500891877590998317214197272810 × 10^24

Evaluation of the parameters of the Positon A

preliminary values for the parameters xA, roA y AoA

Working Precision → χ · digits

$$\chi = 2 / 2;$$

$$\epsilon = \frac{1}{1000} * \zeta$$

0.0010000000000000000000000000000000000000000000000000000000000000000000000

$$xA0 = 1 * \zeta - \epsilon$$

0.999000000000000000000000000000000000000000000000000000000000000000000

$$xA1 = 1 * \zeta$$

1.0000000000000000000000000000000000000000000000000000000000000000000000

$$AoA0 = \frac{v_{HA}}{\omega_A}$$

5.97378498514301711052550144588640020363551129640106264888335392022 86 × 10^-16

$$AoA1 = AoA0 * \frac{10}{100}$$

5.97378498514301711052550144588640020363551129640106264888335392022 86 × 10^-17

$$roA0 = AoA0$$

5.97378498514301711052550144588640020363551129640106264888335392022 86 × 10^-16

$roA1 = AoA1$

$5.9737849851430171105255014458864002036355112964010626488833539202286 \times 10^{-17}$

Balance position radius (in m) of the membrane of positon A (equation 14)

$$RA1 = \frac{v_{HA}}{\omega_A} * Aspin_A$$

$5.9737849851430171118697532239693695364371562382703891910772091805982 \times 10^{-16}$

$$RRA1 = \frac{\hbar}{m_A * c} * \sqrt{\frac{gAB}{2 * \tau_A}} * Aspin_A$$

$5.9737849851430171118697532239693695364371562382703891910772091805982 \times 10^{-16}$

$$\frac{RA1}{RRA1}$$

1.00000000000000000000000000000000000000000000000000000000000000000000

Resolution equations 5, 24 and 25 from Aspin Bubbles[1] with the lasts modifications for positon A

Clear[xA, roA, AoA]

$$AAA = \text{FindRoot}\Big[\Big\{\frac{M_A * xA^2 * \omega_A^2}{E_{mA} * (2 * xA)^{2*xA}} * \left(roA^2 - 2 * xA * AoA^2 - roA * \sqrt{roA^2 + 4 * xA * (xA - 1) * AoA^2}\right) * \left(roA * (2 * xA - 1) + \sqrt{roA^2 + 4 * xA * (xA - 1) * AoA^2}\right) \wedge (2 * (xA - 1)) == -\zeta,$$

$$1 \Big/ \left(k * e^2 * \left(\left(\text{ArcSin}\left[\left(-roA + \sqrt{\left(roA^2 + 4 * xA * (xA - 1) * AoA^2\right)}\right) / (2 * xA * AoA)\right]\right) \wedge 2 - \left(\frac{pi}{2}\right)^2\right)\right) * 2 * m_A * v_{HA} * \omega_A * \text{ArcSin}\left[\left(-roA + \sqrt{roA^2 + 4 * xA * (xA - 1) * AoA^2}\right) \Big/ (2 * xA * AoA)\right] * RA1^2 == \delta_A,$$

$$\left(\left(roA + \frac{-roA + \sqrt{roA^2 + 4 * xA * (xA - 1) * AoA^2}}{2 * xA}\right) \wedge xA\right) \Big/ RA1 == \zeta\Big\},$$

$$\{xA, \{xA0, xA1\}\}, \{roA, \{roA0, roA1\}\}, \{AoA, \{AoA0, AoA1\}\}, \text{WorkingPrecision} \to \chi * \text{digits}\Big]$$

{xA → 0.9937642015705142038219821157604341604574137046044868319669633262949379,
roA → $4.8245332105785726359322769063545720898129421740265532014775421944300017 \times 10^{-16}$,
AoA → $4.8244394155810344052186341127926143164435905049719352823574040259220 62 \times 10^{-16}$}

Exponent x for positon A

$x_A = Re[xA /. AAA]$

0.9937642015705142038219821157604341604574137046044868319669633262949379

Accuracy[xA]

∞

Precision[xA]

∞

Parameter ro for positon A

$roA = Re[roA /. AAA]$

$4.8245332105785726359322769063545720898129421740265532014775421944300017 \times 10^{-16}$

Accuracy[roA]

85

Precision[roA]

70

Other name:

$r_{oA} = roA$

$4.8245332105785726359322769063545720898129421740265532014775421944300017 \times 10^{-16}$

Parameter Ao for positon A

$$A_{oA} = \mathrm{Re}[\mathrm{AoA}\ /.\ \mathrm{AAA}]$$

$4.82443941558103440521863411279261431644359050497193528235740402592206 2 \times 10^{-16}$

Accuracy[AoA]

∞

Precision[AoA]

∞

Verification that roA > AoA:

$$\frac{r_{oA}}{A_{oA}}$$

1.00001944163652160495706628869566425557102017404594160064501473144113

Verification equation (24). Potential + Energy = 0

$$\frac{M_A * x_A^2 * \omega_A^2}{E_{mA} * (2 * x_A)^{2*x_A}} * \left(r_{oA}^2 - 2 * x_A * A_{oA}^2 - r_{oA} * \sqrt{r_{oA}^2 + 4 * x_A * (x_A - 1) * A_{oA}^2}\right) * \left(r_{oA} * (2 * x_A - 1) + \sqrt{r_{oA}^2 + 4 * x_A * (x_A - 1) * A_{oA}^2}\right)\verb|^|(2 * (x_A - 1))$$

-1.000000000000000000000000000000000000000000000000000000000000000532

Verification equation (25). Electric boundary condition

$$1 \Big/ \left(k * e^2 * \left(\left(\mathrm{ArcSin}\left[\left(-r_{oA} + \sqrt{\left(r_{oA}^2 + 4 * x_A * (x_A - 1) * A_{oA}^2\right)}\right) / (2 * x_A * A_{oA})\right]\right)\verb|^|2 - \left(\frac{pi}{2}\right)^2\right)\right) * 2 * m_A * v_{HA} * \omega_A * \mathrm{ArcSin}\left[\left(-r_{oA} + \sqrt{r_{oA}^2 + 4 * x_A * (x_A - 1) * A_{oA}^2}\right) \Big/ (2 * x_A * A_{oA})\right] * RA1^2$$

1.000000000000000000000000000000000000000000000000000000000000000824

Verification equation (5)

Balance position radius or position of equilibrium of the membrane of positon A

$$R_{A1} = \left(r_{oA} + \frac{-r_{oA} + \sqrt{r_{oA}^2 + 4 * x_A * (x_A - 1) * A_{oA}^2}}{2 * x_A}\right)\verb|^|x_A$$

$5.97378498514301711186975322396936953643715623827038919107720918068 71 \times 10^{-16}$

$$\frac{R_{A1}}{RA1}$$

1.0000000000000000000000000000000000000000000000000000000000000001488

Others results

Maximum radius (in m) of the membrane of positon A

$$R_{HA} = (r_{oA} + A_{oA})^{x_A}$$

$1.19705698085688598670971630835107814890131470535047270414631696638239 \times 10^{-15}$

Minimum radius (in m) of the membrane of positon A

$$R_{mA} = (r_{oA} - A_{oA})^{x_A}$$

$1.25045805037743073130573665425086449976031011551228786048198394 90 \times 10^{-20}$

$$\frac{R_{HA}}{R_{mA}}$$

95729.4793292404741448295672777978570103970964159786837131159833 07

Angle φ (in rad) in the position of equilibrium of the membrane of positon A

$$\varphi_{A1} = \mathrm{ArcSin}\left[\frac{-r_{oA} + \sqrt{r_{oA}^2 + 4 * x_A * (x_A - 1) * A_{oA}^2}}{2 * x_A * A_{oA}}\right]$$

-0.00627484525735516947145622341264440968949150060966494568486547604 3256

Total acceleration of the membrane of positon A

$$a_A = \frac{2 * v_{HA} * \omega_A * \varphi_{A1}}{\varphi_{A1}^2 - \left(\frac{pi}{2}\right)^2}$$

$1.545214471030212654887217752559793506682470569018626144265893923290 7 \times 10^{30}$

Checking unitary electric charge e

$$e \Big/ \sqrt{\frac{\delta_A * m_A * a_A * R_{A1}^2}{k}}$$

0.9999999999999999999999999999999999999999999999999999999999999999994390

Repulsive force between two positons A and verification

$$f_{AA} = \delta_A * \frac{m_A * a_A * R_{A1}^2}{d^2}$$

$2.3070773523706157567133013158943290000000000000000000000000000000259 \times 10^{-28}$

f_{AA} / F_E

1.0000000000000000000000000000000000000000000000000000000000000000001122

Checking anharmonic Potential VA of the membrane of positon A

$$VA[r\_] := \frac{1}{2} * M_A * x_A^2 * \omega_A^2 * r^2 * \left(1 - 2 * roA * r^{-\frac{1}{x_A}} + \left(roA^2 - A_{oA}^2\right) * r^{-\frac{2}{x_A}}\right)$$

$VA[R_{HA}]$

$0. \times 10^{-78}$

$VA[R_{A1}]$

$-3.7602404866331861313537663331000000000000000000000000000000000000000200 \times 10^{-11}$

E_{mA}

$3.76024048663318613135376633310000000000000000000000000000000000000000000 \times 10^{-11}$

$$\frac{VA[R_{A1}]}{E_{mA}}$$

-1.0000000000000000000000000000000000000000000000000000000000000000000532

$VA[R_{mA}]$

$0. \times 10^{-80}$

Checking speed of the membrane of positon A

$$velocityA[wt\_] := x_A * A_{oA} * \omega_A * Cos[wt] * (r_{oA} + A_{oA} * Sin[wt])^{x_A - 1}$$

$velocityA[\varphi_{A1}] / v_{HA}$

1.0000000000000000000000000000000000000000000000000000000000000000002658

$velocityA[-pi / 2] / v_{HA}$

$0. \times 10^{-70}$

$velocityA[pi / 2] / v_{HA}$

$0. \times 10^{-70}$

Checking acceleration of the membrane of positon A

$$accelerationA[wt\_] := -x_A * \omega_A^2 * (r_{oA} + A_{oA} * Sin[wt])^{x_A} * \left(x_A - \frac{(2 * x_A - 1) * r_{oA}}{r_{oA} + A_{oA} * Sin[wt]} + \frac{(x_A - 1) * (r_{oA}^2 - A_{oA}^2)}{(r_{oA} + A_{oA} * Sin[wt])^2}\right)$$

$accelerationA[\varphi_{A1}]$

$0. \times 10^{-37}$

$accelerationA[-pi / 2]$

$3.250563415398022051966663022146418281030512023213668017107379725 4 \times 10^{32}$

accelerationA[pi / 2]

$-3.0248437228471906643152368214531071476677346619556758657417331635849 \times 10^{32}$

$$\frac{\text{accelerationA[-pi / 2]}}{\text{-accelerationA[pi / 2]}}$$

1.0746219352907159481741965979928728335384717428268679267211607859

a_A

$1.5452144710302126548872177525597935066824705690186261442658939232907 \times 10^{30}$

$$\frac{2 * \delta_A * \tau_A * m_A * k * e^2 * c^2}{gAB * \hbar^2 * Aspin_A^2} \Big/ a_A$$

0.9999999999999999999999999999999999999999999999999999999999999999991757

Evaluation of the parameters of the Negaton B

preliminary values for the parameters xB, roB y AoB

ε

0.00100000000000000000000000000000000000000000000000000000000000000000000000

$xB0 = 1 * \zeta + \varepsilon$

1.00100000000000000000000000000000000000000000000000000000000000000000000

$xB1 = 1 * \zeta$

1.000000000000000000000000000000000000000000000000000000000000000000000000

$$AoB0 = \frac{v_{HB}}{\omega_B}$$

$2.9901476903958943209185670612883487635236453503391849111594370219747 0 \times 10^{-16}$

$$AoB1 = AoB0 * \frac{1041}{1000}$$

$3.1127437457021259880762283108011710628281148097030914925169739398756 7 \times 10^{-16}$

$roB0 = AoB0$

$2.9901476903958943209185670612883487635236453503391849111594370219747 0 \times 10^{-16}$

$roB1 = AoB1$

$3.1127437457021259880762283108011710628281148097030914925169739398756 7 \times 10^{-16}$

Balance position radius (in m) of the membrane of negaton B (equation 14)

$$RB1 = \frac{v_{HB}}{\omega_B} * Aspin_B$$

$2.9901476903958943195743152832053794311754067634882105723532140786652 9 \times 10^{-16}$

$$RRB1 = \frac{\hbar}{m_B * c} * \sqrt{\frac{gAB}{2 * \tau_B}} * Aspin_B$$

$2.9901476903958943195743152832053794311754067634882105723532140786652 9 \times 10^{-16}$

$$\frac{RB1}{RRB1}$$

1.00000000000000000000000000000000000000000000000000000000000000000000000

Resolution equations 5, 24 and 25 from Aspin Bubbles[1] with the lasts modifications for negaton B

Clear[xB, roB, AoB]

BBB =

FindRoot[

$$\Big\{\frac{M_B * xB^2 * \omega_B^2}{E_{mB} * (2 * xB)^{2*xB}} * \left(roB^2 - 2 * xB * AoB^2 - roB * \sqrt{roB^2 + 4 * xB * (xB-1) * AoB^2}\right) * \left(roB * (2 * xB - 1) + \sqrt{roB^2 + 4 * xB * (xB-1) * AoB^2}\right) \hat{}\, (2 * (xB - 1)) == -\zeta,$$

$$1 \Big/ \left((k * e^2) * \left(\left(\mathrm{ArcSin}\left[\left(-roB + \sqrt{roB^2 + 4 * xB * (xB-1) * AoB^2}\right) \Big/ (2 * xB * AoB)\right]\right) \hat{}\, 2 - \left(\frac{pi}{2}\right)^2\right)\right) * 2 * m_B * v_{HB} * \omega_B * \mathrm{ArcSin}\left[\frac{-roB + \sqrt{roB^2 + 4 * xB * (xB-1) * AoB^2}}{2 * xB * AoB}\right] * RB1^2 == \sigma_B,$$

$$\left(\left(roB + \frac{-roB + \sqrt{roB^2 + 4 * xB * (xB-1) * AoB^2}}{2 * xB}\right) \hat{}\, xB\right) \Big/ RB1 == \zeta\Big\},$$

{xB, {xB0, xB1}}, {roB, {roB0, roB1}}, {AoB, {AoB0, AoB1}}, WorkingPrecision → χ * digits]

{xB → 1.0063145509634473420962347136311057994649768126070012532542345032814 17,
roB → $3.7186902061217803187972072411892017030091797545228862222080950479780 41 \times 10^{-16}$,
AoB → $3.7186160725606075509284902504107680569134374514732121983801650514653 05 \times 10^{-16}$}

Exponent x for the negaton B

x_B = Re[xB /. BBB]

1.006314550963447342096234713631105799464976812607001253254234503281417

Accuracy[xB]

∞

Precision[xB]

∞

Parameter ro for the negaton B

roB = Re[roB /. BBB]

$3.718690206121780318797207241189201703009179754522886222208095047978041 \times 10^{-16}$

Accuracy[roB]

85

Precision[roB]

70

Other name:

r_{oB} = roB

$3.718690206121780318797207241189201703009179754522886222208095047978041 \times 10^{-16}$

Parameter Ao for the negaton B

A_{oB} = Re[AoB /. BBB]

$3.718616072560607550928490250410768056913437451473212198380165051465305 \times 10^{-16}$

Accuracy[AoB]

∞

Precision[AoB]

∞

Verification that roB > AoB:

$$\frac{r_{oB}}{A_{oB}}$$

1.000019935793243027674541605727122862570322496542085193172424473632559

Verification equation (24). Potential + Energy = 0

$$\frac{M_B * x_B^2 * \omega_B^2}{E_{mB} * (2 * x_B)^{2*x_B}} * \left(r_{oB}^2 - 2 * x_B * \Lambda_{oB}^2 - r_{oB} * \sqrt{r_{oB}^2 + 4 * x_B * (x_B - 1) * \Lambda_{oB}^2}\right) * \left(r_{oB} * (2 * x_B - 1) + \sqrt{r_{oB}^2 + 4 * x_B * (x_B - 1) * \Lambda_{oB}^2}\right)\text{^}(2 * (x_B - 1))$$

-1.00000000000000000000000000000000000000000000000000000000000000000173700

Verification equation (25). Electric boundary condition

$$1 \Big/ \left((k * e^2) * \left(\left(\text{ArcSin}\left[\left(-r_{oB} + \sqrt{r_{oB}^2 + 4 * x_B * (x_B - 1) * \Lambda_{oB}^2}\right) \Big/ (2 * x_B * \Lambda_{oB})\right]\right)\text{^}2 - \left(\frac{pi}{2}\right)^2\right)\right) * 2 * m_B * v_{HB} * \omega_B * \text{ArcSin}\left[\frac{-r_{oB} + \sqrt{r_{oB}^2 + 4 * x_B * (x_B - 1) * \Lambda_{oB}^2}}{2 * x_B * \Lambda_{oB}}\right] * RB1^2$$

-0.999999999999999999999999999999999999999999999999999999999999999998852686

Verification equation (5)

Balance position radius or position of equilibrium of the membrane of negaton B

$$R_{B1} = \left(r_{oB} + \frac{-r_{oB} + \sqrt{r_{oB}^2 + 4 * x_B * (x_B - 1) * \Lambda_{oB}^2}}{2 * x_B}\right)\text{^}x_B$$

$2.99014769039589431957431528320537943117540676348821057235321407780 51 \times 10^{-16}$

$$\frac{R_{B1}}{RB1}$$

0.999999999999999999999999999999999999999999999999999999999999999999712312

Others results

Maximum radius (in m) of the membrane of negaton B

$$R_{HB} = (r_{oB} + \Lambda_{oB})^{x_B}$$

$5.968778325605106833489450091690481035268442704586021887552742947630 5 \times 10^{-16}$

Minimum radius (in m) of the membrane of negaton B

$$R_{mB} = (r_{oB} - \Lambda_{oB})^{x_B}$$

$5.532265903174877368231004927627051526245573436335997166028842392 4 \times 10^{-21}$

$$\frac{R_{HB}}{R_{mB}}$$

107890.300829172402757208528670016052342036017900736768367635577 48

Angle φ (in rad) in the position of equilibrium of the membrane of negaton B

$$\varphi_{B1} = \text{ArcSin}\left[\frac{-r_{oB} + \sqrt{r_{oB}^2 + 4 * x_B * (x_B - 1) * \Lambda_{oB}^2}}{2 * x_B * \Lambda_{oB}}\right]$$

0.00627484525735516947992179203320973405681333704651810627288845200276 6

Total acceleration of the membrane of negaton B

$$a_B = \frac{2 * v_{HB} * \omega_B * \varphi_{B1}}{\varphi_{B1}^2 - \left(\frac{pi}{2}\right)^2}$$

$-3.0870645739387684316134313940781291992870944411456090646823598272 40 \times 10^{30}$

Checking unitary electric charge e

$$e \Big/ \sqrt{\frac{\sigma_B * m_B * a_B * R_{B1}^2}{k}}$$

1.00000000000000000000000000000000000000000000000000000000000000000060243

Repulsive force between two negatons B and verification

$$f_{BB} = \sigma_B * \frac{m_B * a_B * R_{B1}^2}{d^2}$$

$2.307077352370615756713301315894328999999999999999999999999999999722031 \times 10^{-28}$

f_{BB} / F_E

$0.999999999999999999999999999999999999999999999999999999999999998795148$

Checking anharmonic Potential VB of the membrane of negaton B

$$VB[r\_] := \frac{1}{2} * M_B * x_B{}^2 * \omega_B{}^2 * r^2 * \left(1 - 2 * roB * r^{-\frac{1}{x_B}} + \left(roB^2 - A_{oB}{}^2\right) * r^{-\frac{2}{x_B}}\right)$$

$VB[R_{HB}]$

$0. \times 10^{-78}$

$VB[R_{B1}]$

$-7.51229386820091310070993013380000000000000000000000000000000000130489 \times 10^{-11}$

E_{mB}

$7.5122938682009131007099301338000000000000000000000000000000000000000000 \times 10^{-11}$

$$\frac{VB[R_{B1}]}{E_{mB}}$$

$-1.000000000000000000000000000000000000000000000000000000000000173700$

$VB[R_{mB}]$

$0. \times 10^{-79}$

Checking speed of the membrane of negaton B

$$velocityB[wt\_] := x_B * A_{oB} * \omega_B * Cos[wt] * (r_{oB} + A_{oB} * Sin[wt])^{x_B - 1}$$

$velocityB[\varphi_{B1}] / v_{HB}$

$1.0000000000000000000000000000000000000000000000000000000000000868502$

$velocityB[-pi / 2] / v_{HB}$

$0. \times 10^{-70}$

$velocityB[pi / 2] / v_{HB}$

$0. \times 10^{-70}$

Checking acceleration of the membrane of negaton B

$$accelerationB[wt\_] := -x_B * \omega_B{}^2 * (r_{oB} + A_{oB} * Sin[wt])^{x_B} * \left(x_B - \frac{(2 * x_B - 1) * r_{oB}}{r_{oB} + A_{oB} * Sin[wt]} + \frac{(x_B - 1) * (r_{oB}{}^2 - A_{oB}{}^2)}{(r_{oB} + A_{oB} * Sin[wt])^2}\right)$$

$accelerationB[\varphi_{B1}]$

$0. \times 10^{-37}$

$accelerationB[-pi / 2]$

$5.66834348866819794919822403279739414662922251165231463753633858 6 \times 10^{32}$

$accelerationB[pi / 2]$

$-6.0958989594970265621328381396866664075965953566904244901829353294457 \times 10^{32}$

$$\frac{accelerationB[-pi / 2]}{-accelerationB[pi / 2]}$$

$0.929861785165791810962752346906095920967211542259631600586019552 4$

a_B

$-3.0870645739387684316134313940781291992870944411456090646823598272 40 \times 10^{30}$

$$\frac{2 * \sigma_B * \tau_B * m_B * k * e^2 * c^2}{gAB * \hbar^2 * Aspin_B{}^2} \Big/ a_B$$

$1.00000000000000000000000000000000000000000000000000000000000114731$

Relation between the position of equilibrium radii of the membranes of positon and negaton

$$\frac{\mathbf{R_{A1}}}{\mathbf{R_{B1}}} \Big/ \left(\sqrt{\frac{\tau_B}{\tau_A}} * \frac{\mathbf{m_B}}{\mathbf{m_A}} * \frac{\mathbf{Aspin_A}}{\mathbf{Aspin_B}}\right)$$

1.00000000000000000000000000000000000000000000000000000000000000030257

Relation between Total accelerations of the membranes of positon and negaton

$$-\frac{\mathbf{a_A}}{\mathbf{a_B}} \Big/ \left(\frac{\tau_A}{\tau_B} * \frac{\mathbf{m_A}}{\mathbf{m_B}} * \left(\frac{\mathbf{Aspin_B}}{\mathbf{Aspin_A}}\right)^2\right)$$

1.0000000000000000000000000000000000000000000000000000000000000115556

Attractive Force (in N) that the positon ***A*** *exerts over the negaton* ***B*** *and verifications*

$$\mathbf{f_{AB}} = \delta_A * \sqrt{\frac{\tau_A}{\tau_B}} * \mathbf{m_A} * \mathbf{a_B} * \frac{\mathbf{R_{A1}} * \mathbf{R_{B1}}}{\mathbf{d}^2}$$

$-2.3070773523706157582696221631324986957202694606273829808778405931621 \times 10^{-28}$

$$\mathbf{f_{AB}} \Big/ \left(\delta_A * \delta_B \frac{\mathbf{Aspin_A}}{\mathbf{Aspin_B}} * \mathbf{F_E}\right)$$

0.99999999999999999999999999999999999999999999999999999999999998825405

$$\mathbf{f_{AB}} / -\mathbf{F_E}$$

1.0000000000000000006745854644357662149815140450295276918189534171488

Attractive Force (in N) that the negaton ***B*** *exerts over the positon* ***A*** *and verifications*

$$\mathbf{f_{BA}} = \delta_B * \sqrt{\frac{\tau_B}{\tau_A}} * \mathbf{m_B} * \mathbf{a_A} * \frac{\mathbf{R_{B1}} * \mathbf{R_{A1}}}{\mathbf{d}^2}$$

$-2.307077352370615755156980468656159305329601960917842886009928501831 \times 10^{-28}$

$$\mathbf{f_{BA}} \Big/ \left(\delta_B * \delta_A * \frac{\mathbf{Aspin_B}}{\mathbf{Aspin_A}} * \mathbf{F_E}\right)$$

0.9999999999999999999999999999999999999999999999999999999999999980962

$$\mathbf{f_{BA}} / -\mathbf{F_E}$$

0.9999999999999999932541453556423378547355150379849071272161496740689

Relation between Forces $\mathbf{f_{AB}}$ *and* $\mathbf{f_{BA}}$

$$\frac{\mathbf{f_{AB}}}{\mathbf{f_{BA}}}$$

1.000000000000000013491709288715324304180936388870737884854558473307

$$\left(\frac{\mathbf{f_{AB}}}{\mathbf{f_{BA}}}\right) \Big/ \left(\frac{\mathbf{Aspin_A}}{\mathbf{Aspin_B}}\right)^2$$

0.9999999999999999999999999999999999999999999999999999999999998844443

Verification of the force of gravity

Gravity force FG between two neutral particles separated by a distance d = 1 m. where every neutral particle is formed by the union of one positon A and one negaton B

$$FG = -G * \frac{(m_A + m_B)^2}{d^2}$$

$-1.049871421545225866887769122531500000000000000000000000000000000000000000 \times 10^{-64}$

Aspin Bubbles said: the gravity force is the result of the SUMMATION (Σ) of all existing forces fij between the two neutral particles

$$\Sigma Fij = f_{AA} + f_{AB} + f_{BA} + f_{BB}$$

$-1.0498714215452258666887769122531 \times 10^{-64}$

Comparison between Gravity force FG and total force ΣFij

$$\frac{FG}{\Sigma Fij}$$

1.000000000000000000000000000000

$$FG - \Sigma Fij$$

$-0. \times 10^{-95}$

$$\frac{FG - \Sigma Fij}{FG}$$

$0. \times 10^{-31}$

Comparison between radiis of the positon A an negaton B

R_{HA}

$1.19705698085688598670971630835107814890131470535047270414631696638239 \times 10^{-15}$

R_{HB}

$5.9687783256051068334894500916904810352684427045860218875527429476305 \times 10^{-16}$

$$\frac{R_{HA}}{R_{HB}}$$

2.0055309739376691242747279044304473445954196245054865609077698254450

R_{A1}

$5.9737849851430171118697532239693695364371562382703891910772091806871 \times 10^{-16}$

R_{B1}

$2.9901476903958943195743152832053794311754067634882105723532140778051 \times 10^{-16}$

$$\frac{R_{A1}}{R_{B1}}$$

1.9978227176972955628211371154968304045361962598824467850906727063000

$R_{\pi A}$

$1.2504580503774307313057366542508644997603101155122878604819839490 \times 10^{-20}$

$R_{\pi B}$

$5.5322659031748773682310049276270515262455734363359971660288423924 \times 10^{-21}$

$$\frac{R_{\pi A}}{R_{\pi B}}$$

2.2602999788202754435371326357024229255594910667870435089465553068

Values α

Value "α limit"

$$\alpha lim = \frac{51714564051}{100000000000} * \zeta$$

0.51714564051000000000000000000000000000000000000000000000000000000000

Value α from Quantum Mechanics

$$\alpha = \frac{3 * \sqrt{3}}{10} * \zeta$$

0.5196152422706631880582339024517617100828415761431141884167420938355799

$$\alpha = \frac{\sqrt{3}}{2} * \zeta$$

0.8660254037844386467637231707529361834714026269051903140279034897259665

Relation between α and "α limit"

$$\alpha = \alpha lim$$

0.51714564051000000000000000000000000000000000000000000000000000000000

$$\frac{\alpha}{\alpha lim}$$

1.000000000000000000000000000000000000000000000000000000000000000000000

Results of the Negaton B

x_B

1.006314550963447342096234713631105799464976812607001253254234503281417

r_{oB}

$3.718690206121780318797207241189201703009179754522886222208095047978041 \times 10^{-16}$

$\bar{\lambda}_{oB}$

$3.718616072560607550928490250410768056913437451473212198380165051465305 \times 10^{-16}$

R_{HB}

$5.968778325605106833489450091690481035268442704586021887552742947630 5 \times 10^{-16}$

R_{B1}

$2.990147690395894319574315283205379431175406763488210572353214077805 1 \times 10^{-16}$

R_{mB}

$5.532265903174877368231004927627051526245573436335997166028842392 4 \times 10^{-21}$

Bohr magneton

$$\mu_{oB} = \frac{e * \hbar}{2 * m_o}$$

$9.274009672985739148572528492480508360065696807733714572205160308533 32 \times 10^{-24}$

---

spin angular momentum of the negaton

$$S_B = \alpha * \hbar$$

$5.453671703627711758563668377385922314029596844347962764159894793928 29 \times 10^{-35}$

moment of inertia of the membrane of the negaton in its balance position

$$I_B = \frac{2}{3} * M_B * R_{B1}^2$$

$4.93467349826973421467014715949517527907599472578103994346633961122 49 \times 10^{-59}$

angular velocity in its balance position

$$\omega_{BS} = \frac{S_B}{I_B}$$

$1.105173767938234640259638347974755522052717587985247009968857659285 9 \times 10^{24}$

rotation kinetic energy of the membrane in its balance position

$$E_{\omega B} = \frac{1}{2} * I_B * \omega_{BS}^2$$

$3.013627452898184739374659518660348643330604647927220925578504888277 1 \times 10^{-11}$

Relations

$$\frac{E_{\omega B}}{E_{mB}}$$

$0.40115942024774722995084072152845375966521049626343568439799534176 80$

$$\frac{E_{mB}}{E_{\omega B}}$$

$2.49277456673564341627410170361523581908386724889284261653307198606 41$

Total energy of the negaton in its balance position

$$E_{TOTALB} = E_{mB} + E_{\omega B}$$

$1.052592132109909784008458965246034864333060464792722092557850488827 71 \times 10^{-10}$

Relations

$$\frac{E_{\omega B}}{E_{TOTALB}}$$

$0.286305337173421619465673684356143569456583371432474999914116722569 4$

$$\frac{E_{TOTALB}}{E_{\omega B}}$$

$3.492774566735643416274101703615235819083867248892842616533071986064$

Tangential velocity of the membrane in its balance position

$$v_{BStanR1} = \omega_{BS} * R_{B1}$$

$3.304632789686640389119628228924534423288681439112913063186179552674 0 \times 10^{8}$

$$\frac{v_{BStanR1}}{c}$$

$1.102306846453969295358200181581797639248376768408534501286946835958 8$

---

moment of inertia of the membrane of the negaton in the position minimum radius

$$I_{mB} = \frac{2}{3} * M_B * R_{mB}^2$$

$1.689192853526824852988343114721435361842623958188947161742405711 2 \times 10^{-68}$

$$\frac{I_{mB}}{I_B}$$

$3.423109662917138906770825330868384475282178639945133287085219376 4 \times 10^{-10}$

angular velocity in the position minimum radius

$$\omega_{mBS} = \frac{S_B}{I_{mB}}$$

$3.228566644857111889830942962801230420979019561221498855686468731 3 \times 10^{33}$

$$\frac{\omega_{mBS}}{\omega_{BS}}$$

$2.921320373790801279346850705157625751425308922166007040067931629\mathrm{5} \times 10^{9}$

rotation kinetic energy of the membrane in the position minimum radius

$$E_{m\omega B} = \frac{1}{2} I_{mB} * \omega_{mBS}^{2}$$

$0.088037712771667454190795636875967275284420920591950283466551189 74$

$$\frac{E_{m\omega B}}{E_{\omega B}}$$

$2.921320373790801279346850705157625751425308922166007040067931629 \times 10^{9}$

Tangential velocity of the membrane in the position minimum radius

$$v_{BStanRmB} = \omega_{mBS} * R_{mB}$$

$1.786128916547071365317863545495251539450579816944970262853608543 6 \times 10^{13}$

$$\frac{v_{BStanRmB}}{c}$$

$59578.847595527949049267395028838635408585889673881331025799473 04$

---

moment of inertia of the membrane of the negaton in the position maximum radius

$$I_{HB} = \frac{2}{3} * M_B * R_{HB}^{2}$$

$1.966274031116205841198835552069402171399806824301525178518425856 8748 \times 10^{-58}$

$$\frac{I_{HB}}{I_B}$$

$3.984608164665096806760235065310301012086227706196006893094706907 9573$

angular velocity in the position maximum radius

$$\omega_{HBS} = \frac{S_B}{I_{HB}}$$

$2.773607145964184484014984610988020732324255599397867577883231304 4702 \times 10^{23}$

$$\frac{\omega_{HBS}}{\omega_{BS}}$$

$0.250965705704226808518326832221033561180562794971399329541508023 74435$

rotation kinetic energy of the membrane in the position maximum radius

$$E_{H\omega B} = \frac{1}{2} I_{HB} * \omega_{HBS}^{2}$$

$7.563171404462244695551056443947415642286599734667106123862352097 600 \times 10^{-12}$

$$\frac{E_{H\omega B}}{E_{\omega B}}$$

$0.250965705704226808518326832221033561180562794971399329541508023 7443$

Tangential velocity of the membrane in the position maximum radius

$$v_{BStanRHB} = \omega_{HBS} * R_{HB}$$

$1.655504621657446421192804779772944495626156496210798282702545008 1238 \times 10^{8}$

$$\frac{v_{BStanRHB}}{c}$$

$0.552216901219525149359429442275343863262282767704182298909782783 16923$

Spin magnetic moment of the negaton B and verifications

$$\mu SB = \frac{gAB}{2} * \frac{e * S_B}{m_B}$$

$5.27721718164122069039681094507575423957373951610094227871073243255 82 \times 10^{-27}$

$$\mu SB \Big/ \frac{\omega_{mBS} * e * R_{mB}{}^2}{3}$$

$1.00000000000000000000000000000000000000000000000000000000000000$

$$\mu SB \Big/ \frac{\omega_{BS} * e * R_{B1}{}^2}{3}$$

$1.00000000000000000000000000000000000000000000000000000000000000000$

$$\mu SB \Big/ \frac{\omega_{HBS} * e * R_{HB}{}^2}{3}$$

$1.00000000000000000000000000000000000000000000000000000000000000000$

Results of the Positon A

x_A

$0.9937642015705142038219821157604341604574137046044868319669633262949379$

r_{oA}

$4.8245332105785726359322769063545720898129421740265532014775421944 30017 \times 10^{-16}$

$\bar{\lambda}_{oA}$

$4.82443941558103440521863411279261431644359050497193528235740402592 2062 \times 10^{-16}$

R_{HA}

$1.19705698085688598670971630835107814890131470535047270414631696638239 \times 10^{-15}$

R_{A1}

$5.97378498514301711186975322396936953643715623827038919107720918068 71 \times 10^{-16}$

R_{mA}

$1.25045805037743073130573665425086449976031011551228786048198394 90 \times 10^{-20}$

---

spin angular momentum of the positon

$$S_A = \alpha * \hbar$$

$5.45367170362771175856366837738592231402959684434796276415989479392829 \times 10^{-35}$

moment of inertia of the membrane of the positon in its balance position

$$I_A = \frac{2}{3} * M_A * R_{A1}{}^2$$

$9.85860281926206114858518872758904689647247682531527389736038619 4904 \times 10^{-59}$

angular velocity in its balance position

$$\omega_{AS} = \frac{S_A}{I_A}$$

$5.53189108396998135059196218938322930341501484736445335065772064525 40 \times 10^{23}$

rotation kinetic energy of the membrane in its balance position

$$E_{\omega A} = \frac{1}{2} * I_A * \omega_{AS}{}^2$$

$1.50845589360987586368312905877347749570279864427072935508544526321 11 \times 10^{-11}$

Relations

$$\frac{E_{\omega A}}{E_{mA}}$$

0.401159420247747229409608093887235195739588105458950733440461510527

$$\frac{E_{mA}}{E_{\omega A}}$$

2.492774566735643419637280681285295654327013010456314604259385136661 8

Total energy of the positon in its balance position

$$E_{TOTALA} = E_{mA} + E_{\omega A}$$

$5.2686963802430619950368953918734774957027986442707293550854452632111 \times 10^{-11}$

Relations

$$\frac{E_{\omega A}}{E_{TOTALA}}$$

0.286305337173421619189991394308917533221147195286660924683130607795 4

$$\frac{E_{TOTALA}}{E_{\omega A}}$$

3.4927745667356434196372806812852956543270130104563146042593851366 62

Tangential velocity of the membrane in its balance position

$$v_{AStanR1} = \omega_{AS} * R_{A1}$$

$3.3046327896866403868903709837041103806315519874214802595506231101034 \times 10^{8}$

$$\frac{v_{AStanR1}}{c}$$

1.102306846453969294614600005615921925771578945932482484115935668436 1

---

moment of inertia of the membrane of the positon in the position minimum radius

$$I_{mA} = \frac{2}{3} * M_A * R_{mA}^2$$

$4.3197085897719127044290241447272646712672568655500529197383320968 \times 10^{-68}$

$$\frac{I_{mA}}{I_A}$$

$4.3816640846225436239028982112916259029269256377303326547839848113 \times 10^{-10}$

angular velocity in the position minimum radius

$$\omega_{mAS} = \frac{S_A}{I_{mA}}$$

$1.2625091693779450202775467644438929465383144014437927238887968316 \times 10^{33}$

$$\frac{\omega_{mAS}}{\omega_{AS}}$$

$2.2822379367453142545031981700628239771063534210989466660428683741 \times 10^{9}$

rotation kinetic energy of the membrane in the position minimum radius

$$E_{m\omega A} = \frac{1}{2} I_{mA} * \omega_{mAS}^2$$

0.0344265526630351236014520206277537242521929131736334654051535887 3

$$\frac{E_{m\omega A}}{E_{\omega A}}$$

$2.282237936745314254503198170062823977106353421098946666042868374 \times 10^{9}$

Tangential velocity of the membrane in the position minimum radius

$$\mathbf{v}_{AStanRmA} = \omega_{mAS} * \mathbf{R}_{mA}$$

$1.5787147545239746021419875195381349096422203106701637464334578448 \times 10^{13}$

$$\frac{\mathbf{v}_{AStanRmA}}{\mathbf{c}}$$

52660.25586687623082706061669964142025354821670230822639418960449

---

moment of inertia of the membrane of the positon in the position maximum radius

$$\mathbf{I}_{HA} = \frac{2}{3} * \mathbf{M}_A * \mathbf{R}_{HA}^2$$

$3.958638495648739026600307127041730889568035518693834254978856596563 9 \times 10^{-58}$

$$\frac{\mathbf{I}_{HA}}{\mathbf{I}_A}$$

4.015415336455406694976316334104974305108593154161711936909307554013 6

angular velocity in the position maximum radius

$$\omega_{HAS} = \frac{\mathbf{S}_A}{\mathbf{I}_{HA}}$$

$1.377663484458680708775645983492142339951352490051230226167135608691 8 \times 10^{23}$

$$\frac{\omega_{HAS}}{\omega_{AS}}$$

0.249040240226493324147214645607085087565387590504547714938768912215 27

rotation kinetic energy of the membrane in the position maximum radius

$$\mathbf{E}_{H\omega A} = \frac{1}{2}\, \mathbf{I}_{HA} * \omega_{HAS}^2$$

$3.756662181156731411350116881325804464338769367920459036059512185016 \times 10^{-12}$

$$\frac{\mathbf{E}_{H\omega A}}{\mathbf{E}_{\omega A}}$$

0.249040240226493324147214645607085087565387590504547714938768912215 3

Tangential velocity of the membrane in the position maximum radius

$$\mathbf{v}_{AStanRHA} = \omega_{HAS} * \mathbf{R}_{HA}$$

$1.649141691342885798265556816286729821659666901924102252721450240776 2 \times 10^{8}$

$$\frac{\mathbf{v}_{AStanRHA}}{\mathbf{c}}$$

0.550094456126339842166928968001833395575170507432879533187406015656 41

Spin magnetic moment of the positon A and verifications

$$\mu SA = \frac{gAB}{2} * \frac{e * S_A}{m_A}$$

$1.05429443717053261565749455829787533864316121091027520957357152353032 \times 10^{-26}$

$$\mu SA \Big/ \frac{\omega_{mAS} * e * R_{mA}{}^2}{3}$$

1.0000000000000000000000000000000000000000000000000000000000000000

$$\mu SA \Big/ \frac{\omega_{AS} * e * R_{A1}{}^2}{3}$$

1.0000000000000000000000000000000000000000000000000000000000000000000

$$\mu SA \Big/ \frac{\omega_{HAS} * e * R_{HA}{}^2}{3}$$

1.0000000000000000000000000000000000000000000000000000000000000000000

$$\frac{S_B}{S_A}$$

1.000000000000000000000000000000000000000000000000000000000000000000000

TESTS and Verifications

spin angular momentum of the negaton

$S = S_B$

$5.45367170362771175856366837738592231402959684434796276415989479392829 \times 10^{-35}$

spin magnetic moment of the negaton B

$$\mu S = \frac{gAB}{2} * \frac{e * S}{m_B}$$

$5.27721718164122069039681094507575423957373951610094227871073243255 82 \times 10^{-27}$

$$\frac{\mu S}{\mu SB}$$

1.00000000000000000000000000000000000000000000000000000000000000000000

$$\frac{\mu S}{\mu SA}$$

0.500544913791253207226022348774621125426234523265559951466150627666 45

Value of the angular momentum J of the proton according to (39)

$J = S$

$5.45367170362771175856366837738592231402959684434796276415989479392829 \times 10^{-35}$

Value α selected

α

0.51714564051000000000000000000000000000000000000000000000000000000000

Value n according to (41)

$n = -\alpha * \mathrm{Sin}[\theta]$

-0.116225830467140893822819074578100446884362688996607254486054380057457

orbital angular momentum of the positon A

$L = n * \hbar$

$-1.22568474564375842772332158024439066614763492176521245004394999874983 \times 10^{-35}$

orbital magnetic moment of the positon

$$\mu L_A = \frac{e * L}{2 * m_A} * \mathrm{Cos}[pi - \theta]$$

$2.2868100063054948708833688407235812951369987912832108620897553830420 1 \times 10^{-27}$

$$-\frac{e * S * \mathrm{Sin}[\theta] * \mathrm{Cos}[pi - \theta]}{2 * m_A}$$

$2.28681000630549487088336884072358129513699879128321086208975538304201 \times 10^{-27}$

$$\frac{e * S * \mathrm{Sin}[\theta] * \mathrm{Cos}[\theta]}{2 * m_A}$$

$2.28681000630549487088336884072358129513699879128321086208975538304201 \times 10^{-27}$

magnetic moment of the proton

μSB

$5.27721718164122069039681094507575423957373951610094227871073243255 82 \times 10^{-27}$

μSA

$1.05429443717053261565749455829787533864316121091027520957357152353032 \times 10^{-26}$

$$\mu = \mu SB + 2 * \mu SA * \mathrm{Sin}[\theta] + 2 * \mu L_A$$

$1.45897825480673927087402099011036631067578014060925102675561378126261 \times 10^{-26}$

$$\frac{\mu SA}{\mu N}$$

2.08738788948022218741527353955623137395178625496661405687104325025334

$$\frac{\mu SB}{\mu N}$$

1.04483139118878379229643147117728519515023508314148296179593927661123

$$\frac{\mu L_A}{\mu N}$$

0.45276341640529506410821928449123749239198093380329637401493149234817

$$\frac{\mu}{\mu N}$$

2.88861766953055998312000000000000000000000000000000000000000000000000

$$2 * \mu o * \alpha \Big/ \frac{\mu}{\mu N}$$

1.00000000000000000000000000000000000000000000000000000000000000000000

$$\frac{\mu}{\mu L_A}$$

6.3799714483662899255662826873766986965847999882137336101559546206635

$$\frac{\mu}{\mu S}$$

2.7646735098990095651325805173724612162046464076433623459591904325674

$$\frac{J}{S}$$

1.000000000000000000000000000000000000000000000000000000000000000000000

component Jz of the angular momentum J of the proton according to (55)

$$Jz = \mu z * \frac{J}{\mu}$$

$5.27285862668144698981566628674848994332248175016909296478591598475 69 \times 10^{-35}$

results

$$\frac{Jz}{\hbar}$$

0.50000000000000000000000000000000000000000000000000000000000000000000

$\frac{J}{\hbar}$

0.51714564051000000000000000000000000000000000000000000000000000000000000

$\frac{J}{Jz}$

1.0342912810200000000000000000000000000000000000000000000000000000000000

$\frac{\mu}{\mu z}$

1.0342912810200000000000000000000000000000000000000000000000000000000000

$2 * \alpha$

1.03429128102000000000000000000000000000000000000000000000000000000000000

Larmor precession frequency ωP for a magnetic field Bp = 1 Tesla according to (56)

$B_p = 1 * \zeta$

1.000000000000000000000000000000000000000000000000000000000000000000000000

$\omega p = \frac{\mu z}{Jz} * B_p$

$2.6752220047206835690983592879527599263105851574716164896614281018057 \times 10^8$

$\frac{\omega p * mp}{e * B_p} \Big/ \mu o$

1.0000000000000000000000000000000000000000000000000000000000000000000000

$\omega_p = \frac{\omega p}{2 * pi}$

$4.2577480591950654874099949472553303241111635559035299257314385173719 \times 10^7$

$\omega p * \frac{mp}{e}$

2.792847356000000000000000000000000000000000000000000000000000000000000

$\frac{\mu z}{pi * \hbar} * B_p$

$4.25774805919506548740999494725533032411116355590352992573143851737195 \times 10^7$

$\frac{\mu}{2 * pi * \alpha * \hbar} * B_p$

$4.2577480591950654874099949472553303241111635559035299257314385173719 \times 10^7$

$\frac{\mu}{2 * pi * \alpha * \hbar} * B_p / \omega_p$

1.000000000000000000000000000000000000000000000000000000000000000000000

$\frac{J}{Jz} \Big/ \frac{\mu}{\mu z}$

1.000000000000000000000000000000000000000000000000000000000000000000000

$\frac{Jz}{J}$

0.96684562497115654163633703605326366400930215974605509297054482096189

angle of precession according to (57)

$\phi = \frac{180}{pi} * \mathrm{ArcCos}\left[\frac{Jz}{J}\right]$

14.795011622334032857226980681292865220234335125803677769715277309049

graphs solutions for the equation (28)

Clear[x]

$$\alpha o = \frac{(n * \hbar)^2}{m_A * R_{A1} * k * e^2}$$

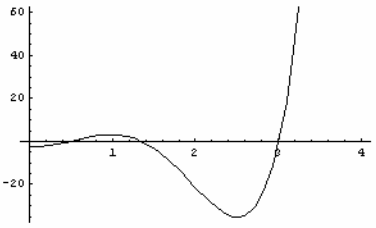
2.6053831734342073195492489761028964922971948199398902412418664094435

$$i1 = \frac{0}{3} * \zeta;$$

$$i2 = 4 * \zeta;$$

$$Fx[x\_] := \frac{Aspin_B}{Aspin_A} * x^3 * (4 * x^2 - 1) - x^3 * (x^2 - 1) - \alpha o * (x^2 - 1) * (4 * x^2 - 1)$$

Plot[Fx[x], {x, i1, i2}]



- Graphics -

numerical solution for the equation (28)

Clear[x]

pr = 80;

$\chi = 5;$

$x0 = 2 * \zeta;$

$x1 = 1000000 * \zeta;$

Clear[x]

$$XXX = FindRoot\left[\frac{Aspin_B}{Aspin_A} * x^3 * (4 * x^2 - 1) - x^3 * (x^2 - 1) - \alpha o * (x^2 - 1) * (4 * x^2 - 1) == 0, \{x, \{x0, x1\}\}, WorkingPrecision \to pr, MaxIterations \to \chi * pr\right]$$

{x → 3.0030120231661881097801357682689385381094999145522623338998840762282199421434887}

x = x /. XXX

3.0030120231661881097801357682689385381094999145522623338998840762282199421434887

Fx[x]

$0. \times 10^{-66}$

Clear[r]

orbital radius r

$r = x * R_{A1}$

$1.7939348134194128796353479388857301489529335300391931138090559875866 1 \times 10^{-15}$

Relationship (65)

$$\frac{r}{R_{HA} + R_{HB}}$$

1.000000000001123903478324163496950902776090863547982193955581768489 56

Others Relationships

$$\frac{r}{R_{HA} + R_{\pi B}}$$

1.4986141440011824222507386895727517654034448501177767061409090394242

$$\frac{r}{R_{HB} + R_{\pi A}}$$

3.0054680094370474593247589980973216973630122510182539774442093384471

$$\frac{r}{R_{\pi B} + R_{\pi A}}$$

99459.449448338751563553655253465697503727992187002426468534334 60

$$\frac{r}{R_{A1} + R_{B1}}$$

2.0012809983666700830951837426969194298211017618662136606016763415579

Diameters ϕ

$\phi maximumpositon = 2 * R_{HA}$

$2.3941139617137719734194326167021562978026294107009454082926339327647 8 \times 10^{-15}$

$\phi balancepositon = 2 * R_{A1}$

$1.1947569970286034223739506447938739072874312476540778382154418361374 2 \times 10^{-15}$

$\phi minimumpositon = 2 * R_{\pi A}$

$2.5009161007548614626114733085017289995206202310245757209639678980 \times 10^{-20}$

$\phi maximumnegaton = 2 * R_{HB}$

$1.1937556651210213666978900183380962070536885409172043775105485895261 1 \times 10^{-15}$

$\phi balancenegaton = 2 * R_{B1}$

$5.9802953807917886391486305664107588623508135269764211447064281556101 \times 10^{-16}$

$\phi minimumnegaton = 2 * R_{\pi B}$

$1.1064531806349754736462009855254103052491146872671994332057684785 \times 10^{-20}$

$\phi orbit = 2 * r$

$3.5878696268388257592706958777714602979058670600783862276181119751732 \times 10^{-15}$

$\phi maximumorbit = 2 * (r + R_{HA})$

$5.9819835885525977326901284944736165957084964707793316359107459079380 \times 10^{-15}$

$\phi minimumorbit = 2 * (r + R_{\pi A})$

$3.5878946359998333078853219925045453151958622662806964733753216148522 \times 10^{-15}$

Bindig Forces

Attraction force that negaton B exerts over positons A according to (25)

$$\mathbf{FBA} = \delta_B * \delta_A * \frac{\mathbf{Aspin}_B}{\mathbf{Aspin}_A} * \frac{\mathbf{k} * \mathbf{e}^2}{\mathbf{r}^2 - \mathbf{R}_{A1}{}^2}$$

-80.629233518236475548513255375854047436397498835562879499075626207812

Repulsive force that positons A exert among each other according to (26)

$$\mathbf{FAA} = \delta_A * \delta_A * \frac{\mathbf{k} * \mathbf{e}^2}{(2 * \mathbf{r})^2 - \mathbf{R}_{A1}{}^2}$$

18.433102031513537944883592560635165654216426015153443042526303899253

Centrifugal force in positons A according to (27)

$$\mathbf{FC} = \frac{\mathbf{L}^2}{\mathbf{m}_A * \mathbf{r}^3}$$

62.196131486722937603629662815218881782181072820409436456549322308559

Equilibrium of the forces

$$\frac{-\mathbf{FBA}}{\mathbf{FAA} + \mathbf{FC}}$$

1.0000000000000000000000000000000000000000000000000000000000000000000

ANNEX II

Mars 2014

The Aspin Bubbles antiproton (V2). Calculus

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Instructions:

1.- Enter values η and factor τ in "**Data In:**"

2.- Click on **Kernel/Evaluation/Evaluation Notebook** and wait 20 seconds

3.- Repeat, Click on **Kernel/Evaluation/Evaluation Notebook**

4.- If is necessary more precision, change quantity of "**digits**"

---

significant digits

```
digits = 70;
pi = N[Pi, digits]
```

3.141592653589793238462643383279502884197169399375105820974944592307816

```
ζ = N[1, digits]
```

1.000000000000000000000000000000000000000000000000000000000000000000000

Mass of the electron in kg

$$m_o = \frac{910938291}{100000000} * 10^{-31} * \zeta$$

$9.109382910000000000000000000000000000000000000000000000000000000000000 \times 10^{-31}$

$$mo = m_o$$

$9.109382910000000000000000000000000000000000000000000000000000000000000 \times 10^{-31}$

Mass of the proton in kg

$$m_p = \frac{1672621777}{1000000000} * 10^{-27} * \zeta$$

$1.672621777000000000000000000000000000000000000000000000000000000000000 \times 10^{-27}$

$$mp = m_p$$

$1.672621777000000000000000000000000000000000000000000000000000000000000 \times 10^{-27}$

Mass of the neutron in kg

$$m_n = \frac{1674927351}{1000000000} * 10^{-27} * \zeta$$

$1.674927351000000000000000000000000000000000000000000000000000000000000 \times 10^{-27}$

$$mn = m_n$$

$1.674927351000000000000000000000000000000000000000000000000000000000000 \times 10^{-27}$

Mass of the proton / 4 times mass of the electron

$$p_o = \frac{m_p}{4 * m_o}$$

459.0381679871661032196087583280654957120470853058036617323401108407243

electric charge of the electron in C

$$e = \frac{1602176565}{1000000000} * 10^{-19} * \zeta$$

$1.602176565000000000000000000000000000000000000000000000000000000000000 \times 10^{-19}$

Planck constant

$$h = \frac{662606957}{100000000} * 10^{-34} * \zeta$$

$6.626069570000000000000000000000000000000000000000000000000000000000000 \times 10^{-34}$

reduced Planck constant

$$\hbar = \frac{h}{2 * pi}$$

$1.054571725336289397963133257349697988664496350033818592957183196951376 \times 10^{-34}$

speed of light in m/s

$$c = \frac{299792458}{100000000} * 10^{8} * \zeta$$

$2.997924580000000000000000000000000000000000000000000000000000000000000 \times 10^{8}$

Gravitational constant

$$G = \frac{667384}{100000} * 10^{-11} * \zeta$$

$6.673840000000000000000000000000000000000000000000000000000000000000000 \times 10^{-11}$

Coulomb constant

$$k = c^2 * 10^{-7}$$

$8.98755178736817640000000000000000000000000000000000000000000000000000 \times 10^{9}$

Data In:

Info: ($\eta = \frac{\text{mass ton}}{\text{mass electron}}$)

POSITON A

$\eta_A = 2 * p_o - \frac{1}{2};$ $\delta_A = 1 * \zeta;$

NEGATON B

$\eta_B = p_o + \frac{1}{4};$ $\delta_B = -1 * \zeta;$

factor τ (excited energy)

$$\tau = \frac{10^0}{1} * \zeta$$

$1.0000000000000000000000000000000000000000000000000000000000000000000000$

$\tau_A = \tau$

$1.0000000000000000000000000000000000000000000000000000000000000000000000$

$\tau_B = \tau$

$1.0000000000000000000000000000000000000000000000000000000000000000000000$

---

large distance **d** in m between the two tons

$d = 1 * \zeta;$

Electric force between two charges **e** separated by a distance **d**

$$F_E = \frac{k * e^2}{d^2}$$

$2.30707735237061575671330131589432900000000000000000000000000000000000 \times 10^{-28}$

Active mass m of the tons

$$m_A = \eta_A * m_o$$

$8.35855419354500000000000000000000000000000000000000000000000000000000 \times 10^{-28}$

$$m_B = \eta_B * m_o$$

$4.18383178822750000000000000000000000000000000000000000000000000000000 \times 10^{-28}$

Verification mass of the antiproton

$$\frac{2 * m_B + m_A}{mp}$$

1.000000000000000000000000000000000000000000000000000000000000000000000

$$\frac{m_A}{mp}$$

0.499727691489036496025484905545385590181754521064088716573011592446820

$$\frac{m_B}{mp}$$

0.250136154255481751987257547227307204909122739467955641713494203776590

$$\frac{m_A}{m_B}$$

1.99782271769729556147343494961867562275946627895887611185597112838628

New GYROMAGNETIC coefficient gAB

angle θ according to (37)

$$\theta = \text{ArcSin}\left[-1 * \zeta + \frac{\sqrt{6}}{2} * \zeta\right]$$

0.22668120151537757708289958479840582314185576662570313271707353696 4992

$$\frac{180}{pi} * \theta$$

12.9878761417856557307483814352015712605614985064732264677528883827618

nuclear magneton

$$\mu N = \frac{e * \hbar}{2 * m_p}$$

$5.05078352942375811681928986058454303882321059709669530117947569496243 \times 10^{-27}$

coefficient of the magnetic moment of the proton

$$\mu o = \frac{2792847356}{1000000000} * \zeta$$

2.79284735600000000000000000000000000000000000000000000000000000000000

the magnetic moment of the antiproton (component z)

$$\mu z = -\mu o * \mu N$$

$-1.410606742587949106014229281693114964044560906753268674823672237614209 \times 10^{-26}$

Verification GIROMAGNETIC coefficient gAB

$$gAB = \frac{2 * m_A * (\mu o * m_B - mp * \text{Sin}[\theta]\,\text{Cos}[\theta])}{mp * (m_B + 2 * m_A * \text{Sin}[\theta])}$$

1.00964049237489984638701758091843804939998195588514615291983811475577

Passive mass M of the membrane of the tons

$$M_A = \frac{m_A}{gAB}$$

$8.27874303444765219272523332557510789055776249521799341287227491211 71 \times 10^{-28}$

$$M_B = \frac{m_B}{gAB}$$

$4.143882718477538047668708364516508470874973928176129611552754219765 9 \times 10^{-28}$

Aspin of the positon A:

$$HA = \frac{G * m_A^2}{k * e^2}$$

$2.021044889986371998268489661769998806335737507871334513830334827064 35 \times 10^{-37}$

$$Aspin_A = \sqrt{1 + HA} + \delta_A * \sqrt{HA}$$

$1.000000000000000000449560328541828966305194636662479182520299917810304398063142430922297$

Aspin of the negaton B:

$$HB = \frac{G * m_B^2}{k * e^2}$$

$5.063631178408492587203590004883727013697030185442795875713890962969 72 \times 10^{-38}$

$$Aspin_B = \sqrt{1 + HB} + \delta_B * \sqrt{HB}$$

$0.99999999999999999977497486410606275147547927743968455602834548762924814814104716261102 58$

Energy of the tons

$$E_{\pi A} = \tau_A * m_A * c^2$$

$7.51229386820091310070993013380000000000000000000000000000000000000 \times 10^{-11}$

Energy positon **A** in eV

$$\frac{E_{\pi A}}{e}$$

$4.688805236769215320978016011487472980232986992916102227472038950962 94 \times 10^{8}$

$$E_{\pi B} = \tau_B * m_B * c^2$$

$3.76024048663318613135376633310000000000000000000000000000000000000 \times 10^{-11}$

Energy negaton **B** in eV

$$\frac{E_{\pi B}}{e}$$

$2.346957613022623465569018813541315279442999467415128494280528937832 77 \times 10^{8}$

Energy antiproton

$$2 * E_{\pi B} + E_{\pi A}$$

$1.503277484146728536341746280000000000000000000000000000000000000000 \times 10^{-10}$

Energy antiproton in eV

$$\frac{2 * E_{\pi B} + E_{\pi A}}{e}$$

$9.382720462814462252116053638570103539118985927746359216033096826628 47 \times 10^{8}$

Verification Energy antiproton

$$\frac{2 * E_{\pi B} + E_{\pi A}}{\tau_A * m_p * c^2}$$

$1.0000000000000000000000000000000000000000000000000000000000000000000$

maximum velocity of the membrane of the positon A

$$v_{HA} = \sqrt{\frac{2 * E_{mA}}{M_A}}$$

$4.26009300645967512194094872770989852201487955259445776816762639846376 \times 10^{8}$

$$\frac{v_{HA}}{c}$$

$1.42101406915969684665681240310251518135752419515318753221190988015574$

maximum velocity of the membrane of the negaton B

$$v_{HB} = \sqrt{\frac{2 * E_{mB}}{M_B}}$$

$4.26009300645967512194094872770989852201487955259445776816762639846376 \times 10^{8}$

$$\frac{v_{HB}}{c}$$

$1.42101406915969684665681240310251518135752419515318753221190988015574$

---

frequency of the membranes in Hz

$$\nu_A = \frac{2 * E_{mA}}{h}$$

$2.26749622497577039497034140974164266132207241524631320766527961462379 \times 10^{23}$

$$\nu_B = \frac{2 * E_{mB}}{h}$$

$1.13498370245248907984338182344197753420207448863233109700054054820314 8 \times 10^{23}$

angular frequency of the membranes in rad/s

$$\omega_A = 2 * pi * \nu_A$$

$1.42470989648529386351680218872727900606500891877590998317214197272810 \times 10^{24}$

$$\omega_B = 2 * pi * \nu_B$$

$7.13131292313776697654094700565848930956006713706417684318969701123605 \times 10^{23}$

Evaluation of the parameters of the Positon A

preliminary values for the parameters xA, roA y AoA

Working Precision → $\chi \cdot$ digits

$\chi = 2 / 2;$

$$\epsilon = \frac{1}{1000} * \zeta$$

$0.0010000000000000000000000000000000000000000000000000000000000000000000000$

$xA0 = 1 * \zeta - \epsilon$

$0.999000000000000000000000000000000000000000000000000000000000000000000$

$xA1 = 1 * \zeta$

$1.0000000000000000000000000000000000000000000000000000000000000000000000$

$$AoA0 = \frac{v_{HA}}{\omega_A}$$

$2.99014769039589432091856706128834876352364535033918491115943702197470 \times 10^{-16}$

$$AoA1 = AoA0 * \frac{10}{100}$$

$2.99014769039589432091856706128834876352364535033918491115943702197470 \times 10^{-17}$

```
roA0 = AoA0
```

$2.990147690395894320918567061288348763523645350339184911159437021974 70\times 10^{-16}$

```
roA1 = AoA1
```

$2.99014769039589432091856706128834876352364535033918491115943702197470\times 10^{-17}$

Balance position radius (in m) of the membrane of positon A (equation 14)

$$RA1 = \frac{v_{HA}}{\omega_A} * Aspin_A$$

$2.99014769039589432226281883937131809647620620818807670560269028316198\times 10^{-16}$

$$RRA1 = \frac{\hbar}{m_A * c} * \sqrt{\frac{gAB}{2 * \tau_A}} * Aspin_A$$

$2.99014769039589432226281883937131809647620620818807670560269028316198\times 10^{-16}$

$$\frac{RA1}{RRA1}$$

1.0000000000000000000000000000000000000000000000000000000000000000000

Resolution equations 5, 24 and 25 from Aspin Bubbles[1] with the lasts modifications for positon A

```
Clear[xA, roA, AoA]
```

$$AAA = FindRoot\Big[\Big\{\frac{M_A * xA^2 * \omega_A{}^2}{E_{mA} * (2 * xA)^{2*xA}} * \left(roA^2 - 2 * xA * AoA^2 - roA * \sqrt{roA^2 + 4 * xA * (xA-1) * AoA^2}\right) * \left(roA * (2 * xA - 1) + \sqrt{roA^2 + 4 * xA * (xA-1) * AoA^2}\right)\,\hat{}\,(2 * (xA - 1)) == -\zeta,$$

$$1 \Big/ \left(k * e^2 * \left(\left(ArcSin\left[\left(-roA + \sqrt{\left(roA^2 + 4 * xA * (xA-1) * AoA^2\right)}\right) / (2 * xA * AoA)\right]\right)\hat{}\,2 - \left(\frac{pi}{2}\right)^2\right)\right) * 2 * m_A * v_{HA} * \omega_A * ArcSin\left[\left(-roA + \sqrt{roA^2 + 4 * xA * (xA-1) * AoA^2}\right) \Big/ (2 * xA * AoA)\right] * RA1^2 == \delta_A,$$

$$\left(\left(roA + \frac{-roA + \sqrt{roA^2 + 4 * xA * (xA-1) * AoA^2}}{2 * xA}\right)\hat{}\,xA\right) \Big/ RA1 == \zeta\Big\},$$

$$\{xA, \{xA0, xA1\}\}, \{roA, \{roA0, roA1\}\}, \{AoA, \{AoA0, AoA1\}\}, WorkingPrecision \to \chi * digits\Big]$$

$\{xA \to 0.993764201570514203823373525103113916475685054530423413018540468040 5949,$
$roA \to 2.40443133934682629114563121705477863086474965701898921891908923671 8315\times 10^{-16},$
$AoA \to 2.40438459417548818412811263866258546421356091893451552814742806350 1826\times 10^{-16}\}$

Exponent x for positon A

```
x_A = Re[xA /. AAA]
```

0.9937642015705142038233735251031139164756850545304234130185404680405949

```
Accuracy[xA]
```

∞

```
Precision[xA]
```

∞

Parameter ro for positon A

```
roA = Re[roA /. AAA]
```

$2.404431339346826291145631217054778630864749657018989218919089236718315\times 10^{-16}$

```
Accuracy[roA]
```

86

```
Precision[roA]
```

70

Other name:

r_{oA} = roA

2.404431339346826291145631217054778630864749657018989218919089236718315 × 10^{-16}

Parameter Ao for positon A

A_{oA} = Re[AoA /. AAA]

2.404384594175488184128112638662585464213560918934515528147428063501826 × 10^{-16}

Accuracy[AoA]

∞

Precision[AoA]

∞

Verification that roA > AoA:

$$\frac{r_{oA}}{A_{oA}}$$

1.000019441636521605178788183128430048218863423344879962940385483312860

Verification equation (24). Potential + Energy = 0

$$\frac{M_A * x_A^2 * \omega_A^2}{E_{mA} * (2 * x_A)^{2*x_A}} * \left(r_{oA}^2 - 2 * x_A * A_{oA}^2 - r_{oA} * \sqrt{r_{oA}^2 + 4 * x_A * (x_A - 1) * A_{oA}^2}\right) * \left(r_{oA} * (2 * x_A - 1) + \sqrt{r_{oA}^2 + 4 * x_A * (x_A - 1) * A_{oA}^2}\right) \wedge (2 * (x_A - 1))$$

-0.99999999999999999999999999999999999999999999999999999999999999951278

Verification equation (25). Electric boundary condition

$$1 \Big/ \left(k * e^2 * \left(\left(\text{ArcSin}\left[\left(-r_{oA} + \sqrt{}\left(r_{oA}^2 + 4 * x_A * (x_A - 1) * A_{oA}^2\right)\right) / (2 * x_A * A_{oA})\right]\right) \wedge 2 - \left(\frac{pi}{2}\right)^2\right)\right) * 2 * m_A * v_{HA} * \omega_A * \text{ArcSin}\left[\left(-r_{oA} + \sqrt{r_{oA}^2 + 4 * x_A * (x_A - 1) * A_{oA}^2}\right) \Big/ (2 * x_A * A_{oA})\right] * RA1^2$$

0.999999999999999999999999999999999999999999999999999999999999999930806

Verification equation (5)

Balance position radius or position of equilibrium of the membrane of positon A

$$R_{A1} = \left(r_{oA} + \frac{-r_{oA} + \sqrt{r_{oA}^2 + 4 * x_A * (x_A - 1) * A_{oA}^2}}{2 * x_A}\right) \wedge x_A$$

2.990147690395894322262818839371318096476206208188076705602690282741 2 × 10^{-16}

$$\frac{R_{A1}}{RA1}$$

0.99999999999999999999999999999999999999999999999999999999999999859282

Others results

Maximum radius (in m) of the membrane of positon A

$R_{MA} = (r_{oA} + A_{oA})^{x_A}$

5.991807832862278370704331043556014888421388792197786236178336605041 7 × 10^{-16}

Minimum radius (in m) of the membrane of positon A

$R_{mA} = (r_{oA} - A_{oA})^{x_A}$

6.259104170257567190932781071590014888522242835124413123380970117 5 × 10^{-21}

$$\frac{R_{MA}}{R_{mA}}$$

95729.47932923938921919926821183005524459220047181240791191046169 8

Angle φ (in rad) in the position of equilibrium of the membrane of positon A

$$\varphi_{A1} = \text{ArcSin}\left[\frac{-r_{oA} + \sqrt{r_{oA}^2 + 4 * x_A * (x_A - 1) * A_{oA}^2}}{2 * x_A * A_{oA}}\right]$$

-0.0062748452573551694686384661657069058025787055914044437657523139999980

Total acceleration of the membrane of positon A

$$a_A = \frac{2 * v_{HA} * \omega_A * \varphi_{A1}}{\varphi_{A1}^2 - \left(\frac{pi}{2}\right)^2}$$

$3.0870645739387684260621443377191132253389553860078664620119873089 10 \times 10^{30}$

Checking unitary electric charge e

$$e \Big/ \sqrt{\frac{\delta_A * m_A * a_A * R_{A1}^2}{k}}$$

1.0000000000000000000000000000000000000000000000000000000000000000004867

Repulsive force between two positons A and verification

$$f_{AA} = \delta_A * \frac{m_A * a_A * R_{A1}^2}{d^2}$$

$2.3070773523706157567133013158943289999999999999999999999999999997754 \times 10^{-28}$

f_{AA} / F_E

0.999999999999999999999999999999999999999999999999999999999999999902662

Checking anharmonic Potential VA of the membrane of positon A

$$VA[r\_] := \frac{1}{2} * M_A * x_A^2 * \omega_A^2 * r^2 * \left(1 - 2 * roA * r^{-\frac{1}{x_A}} + (roA^2 - A_{oA}^2) * r^{-\frac{2}{x_A}}\right)$$

$VA[R_{HA}]$

$0. \times 10^{-78}$

$VA[R_{A1}]$

$-7.512293868200913100709930133799999999999999999999999999999999999996340 \times 10^{-11}$

E_{mA}

$7.51229386820091310070993013380000000000000000000000000000000000000000 \times 10^{-11}$

$$\frac{VA[R_{A1}]}{E_{mA}}$$

-0.99999999999999999999999999999999999999999999999999999999999999951278

$VA[R_{mA}]$

$0. \times 10^{-79}$

Checking speed of the membrane of positon A

$$\text{velocityA}[wt\_] := x_A * A_{oA} * \omega_A * \text{Cos}[wt] * (r_{oA} + A_{oA} * \text{Sin}[wt])^{x_A - 1}$$

$\text{velocityA}[\varphi_{A1}] / v_{HA}$

0.999999999999999999999999999999999999999999999999999999999999999756390

$\text{velocityA}[-pi/2] / v_{HA}$

$0. \times 10^{-70}$

$\text{velocityA}[pi/2] / v_{HA}$

$0. \times 10^{-70}$

Checking acceleration of the membrane of positon A

$$\text{accelerationA}[\text{wt\_}] := -x_A * \omega_A^2 * (r_{oA} + A_{oA} * \text{Sin}[\text{wt}])^{x_A} * \left(x_A - \frac{(2 * x_A - 1) * r_{oA}}{r_{oA} + A_{oA} * \text{Sin}[\text{wt}]} + \frac{(x_A - 1) * (r_{oA}^2 - A_{oA}^2)}{(r_{oA} + A_{oA} * \text{Sin}[\text{wt}])^2}\right)$$

$\text{accelerationA}[\varphi_{A1}]$

$0. \times 10^{-37}$

accelerationA[-pi / 2]

$6.494049436597879032210633695045672207744727369634056972770984500 \times 10^{32}$

accelerationA[pi / 2]

$-6.043101506988179530901539831329532301194833362396722278808912137442 8 \times 10^{32}$

$$\frac{\text{accelerationA}[-\text{pi}/2]}{-\text{accelerationA}[\text{pi}/2]}$$

1.07462193529071587173477956027340803947378847652100629419639464 50

a_A

$3.087064573938768426062144337719113225338955386007866462011987308910 \times 10^{30}$

$$\frac{2 * \delta_A * \tau_A * m_A * k * e^2 * c^2}{gAB * \hbar^2 * Aspin_A^2} \Big/ a_A$$

1.0000000000000000000000000000000000000000000000000000000000000006919

Evaluation of the parameters of the Negaton B

preliminary values for the parameters xB, roB y AoB

ϵ

0.001000000000000000000000000000000000000000000000000000000000000000000000

$xB0 = 1 * \zeta + \epsilon$

1.001000000000000000000000000000000000000000000000000000000000000000000

$xB1 = 1 * \zeta$

1.0000000000000000000000000000000000000000000000000000000000000000000000

$$AoB0 = \frac{v_{HB}}{\omega_B}$$

$5.9737849851430171105255014458864002036355112964010626488833539202286 \times 10^{-16}$

$$AoB1 = AoB0 * \frac{1041}{1000}$$

$6.2187101695338808120570470051677426119845672595535062174875714309580 \times 10^{-16}$

roB0 = AoB0

$5.9737849851430171105255014458864002036355112964010626488833539202286 \times 10^{-16}$

roB1 = AoB1

$6.2187101695338808120570470051677426119845672595535062174875714309580 \times 10^{-16}$

Balance position radius (in m) of the membrane of negaton B (equation 14)

$$RB1 = \frac{v_{HB}}{\omega_B} * Aspin_B$$

$5.9737849851430171091812496678034308711363567935705230578277329761015 \times 10^{-16}$

$$RRB1 = \frac{\hbar}{m_B * c} * \sqrt{\frac{gAB}{2 * \tau_B}} * Aspin_B$$

$5.9737849851430171091812496678034308711363567935705230578277329761015 \times 10^{-16}$

$$\frac{RB1}{RRB1}$$

1.00000000000000000000000000000000000000000000000000000000000000000000

Resolution equations 5, 24 and 25 from Aspin Bubbles[1] with the lasts modifications for negaton B

```
Clear[xB, roB, AoB]
```

BBB =

FindRoot[

$$\Big\{\frac{M_B * xB^2 * \omega_B{}^2}{E_{mB} * (2 * xB)^{2*xB}} * \left(roB^2 - 2 * xB * AoB^2 - roB * \sqrt{roB^2 + 4 * xB * (xB - 1) * AoB^2}\right) * \left(roB * (2 * xB - 1) + \sqrt{roB^2 + 4 * xB * (xB - 1) * AoB^2}\right) \text{^}(2 * (xB - 1)) == -\zeta,$$

$$1 \Big/ \left((k * e^2) * \left(\left(\text{ArcSin}\left[\left(-roB + \sqrt{roB^2 + 4 * xB * (xB - 1) * AoB^2}\right) \Big/ (2 * xB * AoB)\right]\right) \text{^} 2 - \left(\frac{pi}{2}\right)^2\right)\right) * 2 * m_B * v_{HB} * \omega_B * \text{ArcSin}\left[\frac{-roB + \sqrt{roB^2 + 4 * xB * (xB - 1) * AoB^2}}{2 * xB * AoB}\right] * RB1^2 == \phi_B,$$

$$\left(\left(roB + \frac{-roB + \sqrt{roB^2 + 4 * xB * (xB - 1) * AoB^2}}{2 * xB}\right) \text{^} xB\right) \Big/ RB1 == \zeta\Big\},$$

```
 {xB, {xB0, xB1}}, {roB, {roB0, roB1}}, {AoB, {AoB0, AoB1}}, WorkingPrecision → χ * digits]
```

{xB → 1.006314550963447342094807937865863048996303552587486283887206097091562,
roB → $7.397091216233306619381588271698775448089221366752699068084565784405413 \times 10^{-16}$,
AoB → $7.396943752292030618463044958065785704260799327501165374251482369473474 \times 10^{-16}$}

Exponent x for the negaton B

x_B = Re[xB /. BBB]

1.006314550963447342094807937865863048996303552587486283887206097091562

Accuracy[xB]

∞

Precision[xB]

∞

Parameter ro for the negaton B

roB = Re[roB /. BBB]

$7.397091216233306619381588271698775448089221366752699068084565784405413 \times 10^{-16}$

Accuracy[roB]

85

Precision[roB]

70

Other name:

r_{oB} = roB

$7.397091216233306619381588271698775448089221366752699068084565784405413 \times 10^{-16}$

Parameter Ao for the negaton B

A_{oB} = Re[AoB /. BBB]

$7.396943752292030618463044958065785704260799327501165374251482369473474 \times 10^{-16}$

Accuracy[AoB]

∞

Precision[AoB]

∞

Verification that roB > AoB:

$$\frac{r_{oB}}{A_{oB}}$$

1.0000199357932430279018989356243601091338502623353613921225107995416644

Verification equation (24). Potential + Energy = 0

$$\frac{M_B * x_B^2 * \omega_B^2}{E_{mB} * (2 * x_B)^{2*x_B}} * \left(r_{oB}^2 - 2 * x_B * A_{oB}^2 - r_{oB} * \sqrt{r_{oB}^2 + 4 * x_B * (x_B - 1) * A_{oB}^2}\right) * \left(r_{oB} * (2 * x_B - 1) + \sqrt{r_{oB}^2 + 4 * x_B * (x_B - 1) * A_{oB}^2}\right) \wedge (2 * (x_B - 1))$$

-1.00000000000000000000000000000000000000000000000000000000000000043014

Verification equation (25). Electric boundary condition

$$1 \Big/ \left((k * e^2) * \left(\left(\text{ArcSin}\left[\left(-r_{oB} + \sqrt{r_{oB}^2 + 4 * x_B * (x_B - 1) * A_{oB}^2}\right) \Big/ (2 * x_B * A_{oB})\right]\right) \wedge 2 - \left(\frac{pi}{2}\right)^2\right)\right) * 2 * m_B * v_{HB} * \omega_B * \text{ArcSin}\left[\frac{-r_{oB} + \sqrt{r_{oB}^2 + 4 * x_B * (x_B - 1) * A_{oB}^2}}{2 * x_B * A_{oB}}\right] * RB1^2$$

-0.999999999999999999999999999999999999999999999999999999999999999712757

Verification equation (5)

Balance position radius or position of equilibrium of the membrane of negaton B

$$R_{B1} = \left(r_{oB} + \frac{-r_{oB} + \sqrt{r_{oB}^2 + 4 * x_B * (x_B - 1) * A_{oB}^2}}{2 * x_B}\right) \wedge x_B$$

$5.9737849851430171091812496678034308711363567935705230578277329756611 \times 10^{-16}$

$$\frac{R_{B1}}{RB1}$$

0.9999999999999999999999999999999999999999999999999999999999999999926276

Others results

Maximum radius (in m) of the membrane of negaton B

$$R_{HB} = (r_{oB} + A_{oB})^{x_B}$$

$1.1924560935793107838372764053673003903211089933924775513437911655811 6 \times 10^{-15}$

Minimum radius (in m) of the membrane of negaton B

$$R_{mB} = (r_{oB} - A_{oB})^{x_B}$$

$1.1052486501705043733069131842088122653749806251232419778934775718 \times 10^{-20}$

$$\frac{R_{HB}}{R_{mB}}$$

107890.3008291711645655079291343904485407947131810203649942644229 0

Angle φ (in rad) in the position of equilibrium of the membrane of negaton B

$$\varphi_{B1} = \text{ArcSin}\left[\frac{-r_{oB} + \sqrt{r_{oB}^2 + 4 * x_B * (x_B - 1) * A_{oB}^2}}{2 * x_B * A_{oB}}\right]$$

0.006274845257355169477104034786272230166099269845247669479204381825263

Total acceleration of the membrane of negaton B

$$a_B = \frac{2 * v_{HB} * \omega_B * \varphi_{B1}}{\varphi_{B1}^2 - \left(\frac{pi}{2}\right)^2}$$

$-1.5452144710302126562780661378752013648958126701592435698135944123014 \times 10^{30}$

Checking unitary electric charge e

$$e \Big/ \sqrt{\frac{\delta_B * m_B * a_B * R_{B1}^2}{k}}$$

1.00000000000000000000000000000000000000000000000000000000000000000015099

Repulsive force between two negatons B and verification

$$f_{BB} = \delta_B * \frac{m_B * a_B * R_{B1}^2}{d^2}$$

$2.30707735237061575671330131589432899999999999999999999999999999930329 \times 10^{-28}$

f_{BB} / F_E

0.999999999999999999999999999999999999999999999999999999999999999698012

Checking anharmonic Potential VB of the membrane of negaton B

$$VB[r\_] := \frac{1}{2} * M_B * x_B^2 * \omega_B^2 * r^2 * \left(1 - 2 * roB * r^{-\frac{1}{x_B}} + \left(roB^2 - A_{oB}^2\right) * r^{-\frac{2}{x_B}}\right)$$

$VB[R_{HB}]$

$0. \times 10^{-78}$

$VB[R_{B1}]$

$-3.760240486633186131353766333100000000000000000000000000000000000016174 \times 10^{-11}$

$E_{\pi B}$

$3.760240486633186131353766333100000000000000000000000000000000000000000 \times 10^{-11}$

$$\frac{VB[R_{B1}]}{E_{\pi B}}$$

-1.0000000000000000000000000000000000000000000000000000000000000000043014

$VB[R_{\pi B}]$

$0. \times 10^{-80}$

Checking speed of the membrane of negaton B

$$velocityB[wt\_] := x_B * A_{oB} * \omega_B * Cos[wt] * (r_{oB} + A_{oB} * Sin[wt])^{x_B - 1}$$

$velocityB[\varphi_{B1}] / v_{HB}$

1.00000000000000000000000000000000000000000000000000000000000000215071

$velocityB[-pi / 2] / v_{HB}$

$0. \times 10^{-70}$

$velocityB[pi / 2] / v_{HB}$

$0. \times 10^{-70}$

Checking acceleration of the membrane of negaton B

$$accelerationB[wt\_] := -x_B * \omega_B^2 * (r_{oB} + A_{oB} * Sin[wt])^{x_B} * \left(x_B - \frac{(2 * x_B - 1) * r_{oB}}{r_{oB} + A_{oB} * Sin[wt]} + \frac{(x_B - 1) * (r_{oB}^2 - A_{oB}^2)}{(r_{oB} + A_{oB} * Sin[wt])^2}\right)$$

$accelerationB[\varphi_{B1}]$

$0. \times 10^{-37}$

$accelerationB[-pi / 2]$

$2.8372605028746347977783838650278973941180726146444068383421182314 \times 10^{32}$

$accelerationB[pi / 2]$

$-3.0512712191616292869241120956664420317715175682196242963128333732703 \times 10^{32}$

$$\frac{accelerationB[-pi / 2]}{-accelerationB[pi / 2]}$$

0.9298617851657918779405807416695799621693455525654613974476352793

a_B

$-1.5452144710302126562780661378752013648958126701592435698135944123014 \times 10^{30}$

$$\frac{2 * \delta_B * \tau_B * m_B * k * e^2 * c^2}{gAB * \hbar^2 * Aspin_B^2} \Big/ a_B$$

1.0000000000000000000000000000000000000000000000000000000000000000028724

Relation between the position of equilibrium radii of the membranes of positon and negaton

$$\frac{R_{A1}}{R_{B1}} \Big/ \left(\sqrt{\frac{\tau_B}{\tau_A}} * \frac{m_B}{m_A} * \frac{Aspin_A}{Aspin_B} \right)$$

0.99999999999999999999999999999999999999999999999999999999999999993300 6

Relation between Total accelerations of the membranes of positon and negaton

$$-\frac{a_A}{a_B} \Big/ \left(\frac{\tau_A}{\tau_B} * \frac{m_A}{m_B} * \left(\frac{Aspin_B}{Aspin_A} \right)^2 \right)$$

1.0000000000000000000000000000000000000000000000000000000000000021805

---

*Attractive Force (in N) that the positon **A** exerts over the negaton **B** and verifications*

$$f_{AB} = \sigma_A * \sqrt{\frac{\tau_A}{\tau_B}} * m_A * a_B * \frac{R_{A1} * R_{B1}}{d^2}$$

$-2.3070773523706157582696221631324986957202694606273829808778406131392 \times 10^{-28}$

$$f_{AB} \Big/ \left(\sigma_A * \sigma_B \frac{Aspin_A}{Aspin_B} * F_E \right)$$

0.99999999999999999999999999999999999999999999999999999999999999691313

$$f_{AB} / -F_E$$

1.000000000000000000674585464435766214981514045029527691818953425807 8

*Attractive Force (in N) that the negaton **B** exerts over the positon **A** and verifications*

$$f_{BA} = \sigma_B * \sqrt{\frac{\tau_B}{\tau_A}} * m_B * a_A * \frac{R_{B1} * R_{A1}}{d^2}$$

$-2.3070773523706157551569804686561593053296019609178428860099285001 80 \times 10^{-28}$

$$f_{BA} \Big/ \left(\sigma_B * \sigma_A * \frac{Aspin_B}{Aspin_A} * F_E \right)$$

0.99999999999999999999999999999999999999999999999999999999999999909361

$$f_{BA} / -F_E$$

0.99999999999999999932541453556423378547355515037984907127216149666908 8

Relation between Forces $\mathbf{f_{AB}}$ *and* $\mathbf{f_{BA}}$

$$\frac{f_{AB}}{f_{BA}}$$

1.0000000000000000013491709288715324304180936388870737884854558567058

$$\left(\frac{f_{AB}}{f_{BA}} \right) \Big/ \left(\frac{Aspin_A}{Aspin_B} \right)^2$$

0.99999999999999999999999999999999999999999999999999999999999999781951

Verification of the force of gravity

Gravity force FG between two neutral particles separated by a distance d = 1 m. where every neutral particle is formed by the union of one positon A and one negaton B

$$FG = -G * \frac{(m_A + m_B)^2}{d^2}$$

$-1.049871421545225866887769122531500000000000000000000000000000000000000 \times 10^{-64}$

Aspin Bubbles said: the gravity force is the result of the SUMMATION (Σ) of all existing forces fij between the two neutral particles

$$\Sigma Fij = f_{AA} + f_{AB} + f_{BA} + f_{BB}$$

$-1.049871421545225866887769122531 \times 10^{-64}$

Comparison between Gravity force FG and total force ΣFij

$$\frac{FG}{\Sigma Fij}$$

1.000000000000000000000000000000

$$FG - \Sigma Fij$$

$-0. \times 10^{-95}$

$$\frac{FG - \Sigma Fij}{FG}$$

$0. \times 10^{-31}$

Comparison between radiis of the positon A an negaton B

R_{HA}

$5.991807832862278370704331043556014888421388792197786236178336605041 7 \times 10^{-16}$

R_{HB}

$1.192456093579310783837276405367300390321108993392477551343791165581 16 \times 10^{-15}$

$$\frac{R_{HA}}{R_{HB}}$$

0.502476180475299032330682937443736957048209977715806897268607334084 39

$$\frac{R_{HB}}{R_{HA}}$$

1.990144088131872123196549930978141637090617816925145235418377378263 9

R_{A1}

$2.990147690395894322262818839371318096476206208188076705602690282741 2 \times 10^{-16}$

R_{B1}

$5.973784985143017109181249667803430871136356793570523057827732975661 1 \times 10^{-16}$

$$\frac{R_{A1}}{R_{B1}}$$

0.500544913791253207563682671915454231875351621770507932990522589871 30

$$\frac{R_{B1}}{R_{A1}}$$

1.997822717697295560125732783740520841891876589525308520683762962909 9

R_{mA}

$6.259104170257567190932781071590014888522242835124413123380970117 5 \times 10^{-21}$

R_{mB}

$1.105248650170504373306913184208812265374980625123241977893477571 8 \times 10^{-20}$

$\frac{R_{mA}}{R_{mB}}$

0.5663073344891204725082470432365225638826579021273130650158068928

$\frac{R_{mB}}{R_{mA}}$

1.7658256199385518436681366747468298883857315971803172158321364783

Values α

Value "α limit"

$$\alpha lim = \frac{51714564051}{100000000000} * \zeta$$

0.5171456405100000000000000000000000000000000000000000000000000000000000

Value α from Quantum Mechanics

$$\alpha = \frac{3 * \sqrt{3}}{10} * \zeta$$

0.5196152422706631880582339024517617100828415761431141884167420938355799

$$\alpha = \frac{\sqrt{3}}{2} * \zeta$$

0.8660254037844386467637231707529361834714026269051903140279034897259665

$$\alpha = \alpha lim$$

0.5171456405100000000000000000000000000000000000000000000000000000000000

Relation between α and "α limit"

$\frac{\alpha}{\alpha lim}$

1.00000000000000000000000000000000000000000000000000000000000000000000

Results of the Negaton B

x_B

1.0063145509634473420948079378658630489963035525874862838872060970915 62

r_{oB}

$7.3970912162333066193815882716987754480892213667526990680845657844054 13 \times 10^{-16}$

$\bar{\lambda}_{oB}$

$7.3969437522920306184630449580657857042607993275011653742514823694734 74 \times 10^{-16}$

R_{HB}

$1.1924560935793107838372764053673003903211089933924775513437911655811 6 \times 10^{-15}$

R_{B1}

$5.9737849851430171091812496678034308711363567935705230578277329756611 \times 10^{-16}$

R_{mB}

$1.1052486501705043733069131842088122653749806251232419778934775718 \times 10^{-20}$

Bohr magneton

$$\mu_{oB} = \frac{e * \hbar}{2 * m_o}$$

$9.2740096729857391485725284924805083600656968077337145722051603085333 2 \times 10^{-24}$

spin angular momentum of the negaton

$$S_B = \alpha * \hbar$$

$$5.453671703627711758563668377385922314029596844347962764159894793928 29 \times 10^{-35}$$

moment of inertia of the membrane of the negaton in its balance position

$$I_B = \frac{2}{3} * M_B * R_{B1}^2$$

$$9.858602819262061139711454971073854143924308699606286399296524443349 \times 10^{-59}$$

angular velocity in its balance position

$$\omega_{BS} = \frac{S_B}{I_B}$$

$$5.531891083969981355571220361066448842639729157116527736846494096528 2 \times 10^{23}$$

rotation kinetic energy of the membrane in its balance position

$$E_{\omega B} = \frac{1}{2} * I_B * \omega_{BS}^2$$

$$1.508455893609875865040891028571768954917614290252681102760809722535 2 \times 10^{-11}$$

Relations

$$\frac{E_{\omega B}}{E_{mB}}$$

$$0.401159420247747229770691906112764804341664828456199986778494577389 8$$

$$\frac{E_{mB}}{E_{\omega B}}$$

$$2.492774566735643417393532938754740826303138170175764397130096979261 9$$

Total energy of the negaton in its balance position

$$E_{TOTALB} = E_{mB} + E_{\omega B}$$

$$5.268696380243061996394657361671768954917614290252681102760809722535 2 \times 10^{-11}$$

Relations

$$\frac{E_{\omega B}}{E_{TOTALB}}$$

$$0.286305337173421619373913070810845350100257864854728204520977494062 4$$

$$\frac{E_{TOTALB}}{E_{\omega B}}$$

$$3.492774566735643417393532938754740826303138170175764397130096979262$$

Tangential velocity of the membrane in its balance position

$$v_{BStanR1} = \omega_{BS} * R_{B1}$$

$$3.304632789686664038837762186886170478943924409477989209598409784687 03 \times 10^{8}$$

$$\frac{v_{BStanR1}}{c}$$

$$1.102306846453969295110693501456165648249644790857244346014901364486 7$$

---

moment of inertia of the membrane of the negaton in the position minimum radius

$$I_{mB} = \frac{2}{3} * M_B * R_{mB}^2$$

$$3.374707857347888399142862243641307018273266408927913263500613623 1 \times 10^{-68}$$

$$\frac{I_{mB}}{I_B}$$

$$3.423109662917217475926721576929734801328206622101629017661445305 0 \times 10^{-10}$$

angular velocity in the position minimum radius

$$\omega_{mBS} = \frac{S_B}{I_{mB}}$$

$1.616042612919281587759829403238435181488386456408811420796058523 4\times 10^{33}$

$$\frac{\omega_{mBS}}{\omega_{BS}}$$

$2.921320373790734227543527628271506599871067459568146290125996256 8\times 10^{9}$

rotation kinetic energy of the membrane in the position minimum radius

$$E_{m\omega B} = \frac{1}{2} I_{mB} * \omega_{mBS}^2$$

0.04406682934967238584362040325754650948548291497073351861621651417

$$\frac{E_{m\omega B}}{E_{\omega B}}$$

$2.92132037379073422754352762827150659987106745956814629012599625 7\times 10^{9}$

Tangential velocity of the membrane in the position minimum radius

$$v_{BStanRmB} = \omega_{mBS} * R_{mB}$$

$1.786128916547050866794476563039206065476800470920865089208625376 5\times 10^{13}$

$$\frac{v_{BStanRmB}}{c}$$

59578.84759552726529212674733262322648146140057068630756577022950

---

moment of inertia of the membrane of the negaton in the position maximum radius

$$I_{HB} = \frac{2}{3} * M_B * R_{HB}^2$$

$3.928266928582195051823919018547017321310543753173870272281370694 6824\times 10^{-58}$

$$\frac{I_{HB}}{I_B}$$

3.984608164665096805874626246715919884963659789520846951442882055 1808

angular velocity in the position maximum radius

$$\omega_{HBS} = \frac{S_B}{I_{HB}}$$

$1.388314949767446573181517844839842071494613782434830260460317860 1224\times 10^{23}$

$$\frac{\omega_{HBS}}{\omega_{BS}}$$

0.2509657057042268085741058280348179271985346011158671108557455324 2343

rotation kinetic energy of the membrane in the position maximum radius

$$E_{H\omega B} = \frac{1}{2} I_{HB} * \omega_{HBS}^2$$

$3.785706978635025712641558683825736173573720486092044056011348992 469\times 10^{-12}$

$$\frac{E_{H\omega B}}{E_{\omega B}}$$

0.2509657057042268085741058280348179271985346011158671108557455324 234

Tangential velocity of the membrane in the position maximum radius

$$\mathbf{v}_{BStanRHB} = \omega_{HBS} * \mathbf{R}_{HB}$$

$1.6555046216574464210050598419469220668953398668162150309563167334059 \times 10^{8}$

$$\frac{\mathbf{v}_{BStanRHB}}{\mathbf{c}}$$

$0.5522169012195251492968044719613733801453203558630601143929767350604 7$

Spin magnetic moment of the negaton B and verifications

$$\mu SB = \frac{gAB}{2} * \frac{e * S_B}{m_B}$$

$1.0542944371705326156574945582978753386431612109102752095735715235303 2 \times 10^{-26}$

$$\mu SB \Big/ \frac{\omega_{mBS} * e * R_{mB}^{2}}{3}$$

$1.0000000000000000000000000000000000000000000000000000000000000000$

$$\mu SB \Big/ \frac{\omega_{BS} * e * R_{B1}^{2}}{3}$$

$1.0000000000000000000000000000000000000000000000000000000000000000000$

$$\mu SB \Big/ \frac{\omega_{HBS} * e * R_{HB}^{2}}{3}$$

$1.0000000000000000000000000000000000000000000000000000000000000000000$

Results of the Positon A

$\mathbf{x}_A$

$0.9937642015705142038233735251031139164756850545304234130185404680405949$

$\mathbf{r}_{oA}$

$2.4044313393468262911456312170547786308647496570189892189190892367183 15 \times 10^{-16}$

$\mathbf{A}_{oA}$

$2.4043845941754881841281126386625854642135609189345155281474280635018 26 \times 10^{-16}$

$\mathbf{R}_{HA}$

$5.9918078328622783707043310435560148884213887921977862361783366050417 \times 10^{-16}$

$\mathbf{R}_{A1}$

$2.9901476903958943222628188393713180964762062081880767056026902827412 \times 10^{-16}$

$\mathbf{R}_{mA}$

$6.2591041702575671909327810715900148885222428351244131233809701175 \times 10^{-21}$

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spin angular momentum of the positon

$$S_A = \alpha * \hbar$$

$5.4536717036277117585636683773859223140295968443479627641598947939282 9 \times 10^{-35}$

moment of inertia of the membrane of the positon in its balance position

$$I_A = \frac{2}{3} * M_A * R_{A1}^{2}$$

$4.9346734982697342235438809160103680316241628514900274422022455010762 \times 10^{-59}$

angular velocity in its balance position

$$\omega_{AS} = \frac{S_A}{I_A}$$

$1.1051737679382346382722692191342602887436203665078660475626712594222 \times 10^{24}$

rotation kinetic energy of the membrane in its balance position

$$E_{\omega A} = \frac{1}{2} * I_A * \omega_{AS}^2$$

$$3.0136274528981847339554301273500161307386949149979279672881594860240 \times 10^{-11}$$

Relations

$$\frac{E_{\omega A}}{E_{mA}}$$

$$0.40115942024774722922945927847154624065909398228120634404243724623 62$$

$$\frac{E_{mA}}{E_{\omega A}}$$

$$2.4927745667356434207567119164248006630565880110602091899541418428901$$

Total energy of the positon in its balance position

$$E_{TOTALA} = E_{mA} + E_{\omega A}$$

$$1.0525921321099097834665360261150016130738694914997927967288159486024 0 \times 10^{-10}$$

Relations

$$\frac{E_{\omega A}}{E_{TOTALA}}$$

$$0.28630533717342161909823078076361931391773280871161231483514240309 81$$

$$\frac{E_{TOTALA}}{E_{\omega A}}$$

$$3.492774566735643420756711916424800663056588011060209189954141842890$$

Tangential velocity of the membrane in its balance position

$$v_{AStanR1} = \omega_{AS} * R_{A1}$$

$$3.3046327896866403861483646236412807472826613481057355927309424066833 \times 10^{8}$$

$$\frac{v_{AStanR1}}{c}$$

$$1.1023068464539692943670933254902899349398113771446964128533688484863$$

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moment of inertia of the membrane of the positon in the position minimum radius

$$I_{mA} = \frac{2}{3} * M_A * R_{mA}^2$$

$$2.1622081636707670205705775133570051449114855531168068644383882418 \times 10^{-68}$$

$$\frac{I_{mA}}{I_A}$$

$$4.3816640846226429398531154484069255500002779332726480337654353202 \times 10^{-10}$$

angular velocity in the position minimum radius

$$\omega_{mAS} = \frac{S_A}{I_{mA}}$$

$$2.5222694998843441888579190522236284170118291166621721534308314491 \times 10^{33}$$

$$\frac{\omega_{mAS}}{\omega_{AS}}$$

$$2.2822379367452625246980528702979671512818169781480288538814208756 \times 10^{9}$$

rotation kinetic energy of the membrane in the position minimum radius

$$E_{m\omega A} = \frac{1}{2} I_{mA} * \omega_{mAS}^{2}$$

0.06877814900221233949415413533185739982490824323942844637079375832

$$\frac{E_{m\omega A}}{E_{\omega A}}$$

$2.28223793674526252469805287029796715128181697814802885388142087 6 \times 10^{9}$

Tangential velocity of the membrane in the position minimum radius

$$v_{AStanRmA} = \omega_{mAS} * R_{mA}$$

$1.5787147545239567100056509781953253423390772310875855740766877410 \times 10^{13}$

$$\frac{v_{AStanRmA}}{c}$$

52660.25586687563400963379066044834731429692040777041742913651754

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moment of inertia of the membrane of the positon in the position maximum radius

$$I_{HA} = \frac{2}{3} * M_A * R_{HA}^{2}$$

$1.9814763645352343610002310825351318954060833556964554618463389896978 \times 10^{-58}$

$$\frac{I_{HA}}{I_A}$$

4.0154153364554066940656020592560566471072229739834669812823817880736

angular velocity in the position maximum radius

$$\omega_{HAS} = \frac{S_A}{I_{HA}}$$

$$\frac{\omega_{HAS}}{\omega_{AS}}$$

0.2490402402264933242036980932163383736873672058322310601109116330867 9

rotation kinetic energy of the membrane in the position maximum radius

$$E_{H\omega A} = \frac{1}{2} I_{HA} * \omega_{HAS}^{2}$$

$7.5051450482291912142702992799787043412431398947371896487014496946 40 \times 10^{-12}$

$$\frac{E_{H\omega A}}{E_{\omega A}}$$

0.24904024022649332420369809321633837368736720583223106011091163308 68

Tangential velocity of the membrane in the position maximum radius

$$v_{AStanRHA} = \omega_{HAS} * R_{HA}$$

$1.6491416913428857980822828487572159235646380279044265609241555652346 \times 10^{8}$

$$\frac{v_{AStanRHA}}{c}$$

0.5500944561263398421057953528494755940673591021107097233660746613027 1

Spin magnetic moment of the positon A and verifications

$$\mu SA = \frac{gAB}{2} * \frac{e * S_A}{m_A}$$

5.2772171816412206903968109450757542395737395161009422787107324325582 × 10^{-27}

$$\mu SA \Big/ \frac{\omega_{mAS} * e * R_{mA}{}^2}{3}$$

1.0000000000000000000000000000000000000000000000000000000000000000

$$\mu SA \Big/ \frac{\omega_{AS} * e * R_{A1}{}^2}{3}$$

1.0000000000000000000000000000000000000000000000000000000000000000000

$$\mu SA \Big/ \frac{\omega_{HAS} * e * R_{HA}{}^2}{3}$$

1.0000000000000000000000000000000000000000000000000000000000000000000

$$\frac{S_B}{S_A}$$

1.000000000000000000000000000000000000000000000000000000000000000000000

TESTS and Verifications

spin angular momentum of the positon

$$S = S_A$$

5.4536717036277117585636683773859223140295968443479627641598947939 2829 × 10^{-35}

spin magnetic moment of the positon

$$\mu S = \frac{gAB}{2} * \frac{e * S}{m_A}$$

5.2772171816412206903968109450757542395737395161009422787107324325582 × 10^{-27}

$$\frac{\mu S}{\mu SB}$$

0.50054491379125320722602234877462112542623452326555995146615062766645

$$\frac{\mu S}{\mu SA}$$

1.00000000000000000000000000000000000000000000000000000000000000000000

Value of the angular momentum J of the antiproton according to (84)

$$J = -S$$

-5.45367170362771175856366837738592231402959684434796276415989479392829 × 10^{-35}

Value α selected

$$\alpha$$

0.5171456405100000000000000000000000000000000000000000000000000000000000

Value n according to (85)

$$n = \alpha * \mathrm{Sin}[\theta]$$

0.116225830467140893822819074578100446884362688996607254486054380057457

orbital angular momentum of one negaton

$$L = n * \hbar$$

1.22568474564375842772332158024439066614763492176521245004394999874983 × 10^{-35}

orbital magnetic moment of one negaton

$$\mu L_B = \frac{e * L}{2 * m_B} * \text{Cos}[\text{pi} - \theta]$$

$-2.2868100063054948708833688407235812951369987912832108620897553830 4201 \times 10^{-27}$

$$\frac{e * S * \text{Sin}[\theta] * \text{Cos}[\text{pi} - \theta]}{2 * m_B}$$

$-2.28681000630549487088336884072358129513699879128321086208975538304201 \times 10^{-27}$

$$-\frac{e * S * \text{Sin}[\theta] * \text{Cos}[\theta]}{2 * m_B}$$

$-2.28681000630549487088336884072358129513699879128321086208975538304201 \times 10^{-27}$

magnetic moment of the antiproton

μSB

$1.05429443717053261565749455829787533864316121091027520957357152353032 \times 10^{-26}$

μSA

$5.27721718164122069039681094507575423957373951610094227871073243255 82 \times 10^{-27}$

$$\mu = -\mu SA - 2 * \mu SB * \text{Sin}[\theta] + 2 * \mu L_B$$

$-1.45897825480673927087402099011036631067578014060925102675561378126261 \times 10^{-26}$

$$\frac{\mu}{\mu N}$$

-2.88861766953055998312000000000000000000000000000000000000000000000000

$$-2 * \mu o * \alpha \Big/ \frac{\mu}{\mu N}$$

1.000000000000000000000000000000000000000000000000000000000000000000

$$\frac{\mu}{\mu L_B}$$

6.3799714483662899255662826873766986965847999882137336101559546206635

$$\frac{\mu}{\mu S}$$

-2.7646735098990095651325805173724612162046464076433623459591904325674

$$\frac{J}{-S}$$

1.00000000000000000000000000000000000000000000000000000000000000000000

component Jz of the angular momentum J of the antiproton according to (55)

$$Jz = \mu z * \frac{J}{\mu}$$

$-5.27285862668144698981566628674848994332248175016909296478591598475 69 \times 10^{-35}$

results

$$\frac{Jz}{\hbar}$$

-0.50000000000000000000000000000000000000000000000000000000000000000000

$$\frac{J}{\hbar}$$

-0.517145640510000000000000000000000000000000000000000000000000000000000

$$\frac{J}{Jz}$$

1.0342912810200000000000000000000000000000000000000000000000000000000

$$\frac{\mu}{\mu z}$$

1.0342912810200000000000000000000000000000000000000000000000000000000

$2*\alpha$

1.034291281020000000000000000000000000000000000000000000000000000000000

Larmor precession frequency ωP for a magnetic field Bp = 1 Tesla according to (56)

$B_P = 1*\zeta$

1.0000000000000000000000000000000000000000000000000000000000000000000000

$\omega p = \frac{\mu z}{Jz} * B_P$

$2.6752220047206835690983592879527599263105851574716164896614281018057 \times 10^{8}$

$\frac{\omega p * mp}{e * B_P} \Big/ \mu o$

1.00000000000000000000000000000000000000000000000000000000000000000000

$\omega_P = \frac{\omega p}{2 * pi}$

$4.2577480591950654874099949472553303241111635559035299257314385173719 \times 10^{7}$

$-\frac{\mu z}{pi * \hbar} * B_P$

$4.25774805919506548740999494725533032411116355590352992573143851737195 \times 10^{7}$

$-\frac{\mu}{2 * pi * \alpha * \hbar} * B_P$

$4.2577480591950654874099949472553303241111635559035299257314385173719 \times 10^{7}$

$-\frac{\mu}{2 * pi * \alpha * \hbar} * B_P / \omega_P$

1.00000000000000000000000000000000000000000000000000000000000000000000

$\frac{J}{Jz} \Big/ \frac{\mu}{\mu z}$

1.000000000000000000000000000000000000000000000000000000000000000000000

$\frac{Jz}{J}$

0.96684562497115654163633703605326366400930215974605509297054482096189

angle of precession according to (57)

$\phi = \frac{180}{pi} * \mathrm{ArcCos}\left[\frac{Jz}{J}\right]$

14.7950116223340328572269806812928652202343351258036777697152773 09049

graphs solutions for the equation (92)

Clear[x]

$$\alpha o = \frac{(n * \hbar)^2}{m_B * R_{B1} * k * e^2}$$

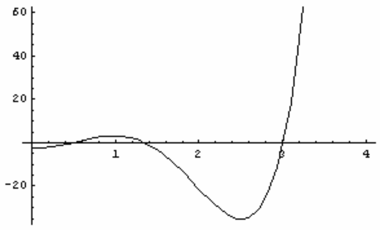
2.6053831734342073207218023814185164549158105139443123571586332294236

$$i1 = \frac{0}{3} * \zeta;$$

$$i2 = 4 * \zeta;$$

$$Fx[x\_] := \frac{Aspin_A}{Aspin_B} * x^3 * (4 * x^2 - 1) - x^3 * (x^2 - 1) - \alpha o * (x^2 - 1) * (4 * x^2 - 1)$$

Plot[Fx[x], {x, i1, i2}]



- Graphics -

numerical solution for the equation (92)

Clear[x]

pr = 80;

$\chi = 5;$

$x0 = 2 * \zeta;$

$x1 = 10000000 * \zeta;$

Clear[x]

$$XXX = FindRoot\left[\frac{Aspin_A}{Aspin_B} * x^3 * (4 * x^2 - 1) - x^3 * (x^2 - 1) - \alpha o * (x^2 - 1) * (4 * x^2 - 1) == 0, \{x, \{x0, x1\}\}, WorkingPrecision \to pr, MaxIterations \to \chi * pr\right]$$

{x → 3.0030120231661881041555932915141925087942069645913528701377597059929751352658236}

x = x /. XXX

3.0030120231661881041555932915141925087942069645913528701377597059929751352658236

Fx[x]

$-0. \times 10^{-66}$

Clear[r]

orbital radius r of the negatons

$$r = x * R_{B1}$$

$1.7939348134194128754680063489429315407509394442214074066272600855492 7 \times 10^{-15}$

Relationship (93)

$$\frac{\mathbf{r}}{\mathbf{R}_{HA} + \mathbf{R}_{HB}}$$

1.00128259056483280537904166952899095857516583515684031194842596792928

Others Relationships

$$\frac{\mathbf{r}}{\mathbf{R}_{A1} + \mathbf{R}_{B1}}$$

2.0012809983666700784461733799631786554192243566632810443354585676874

$$\frac{\mathbf{r}}{\mathbf{R}_{mB} + \mathbf{R}_{mA}}$$

103626.22634815538366839294829977268538796463700621272226391553997

$$\frac{\mathbf{r}}{\mathbf{R}_{HA} + \mathbf{R}_{mB}}$$

2.9939239928159557771255623084723701500405661490727687870281783186128

$$\frac{\mathbf{r}}{\mathbf{R}_{HB} + \mathbf{R}_{mA}}$$

1.5043953458005583876380584824870331430770382165389993557585005621717

Diameters ϕ

$\phi \mathbf{maximumpositon} = 2 * \mathbf{R}_{HA}$

$1.19836156657245567414086620871120297768427775843955724723566732100834 \times 10^{-15}$

$\phi \mathbf{balancepositon} = 2 * \mathbf{R}_{A1}$

$5.9802953807917886445256376787426361929524124163761534112053805654824 \times 10^{-16}$

$\phi \mathbf{minimumpositon} = 2 * \mathbf{R}_{mA}$

$1.2518208340515134381865562143180029777044485670248826246761940235 \times 10^{-20}$

$\phi \mathbf{maximumnegaton} = 2 * \mathbf{R}_{HB}$

$2.38491218715862156767455281073460078064221798678495510268758233116233 \times 10^{-15}$

$\phi \mathbf{balancenegaton} = 2 * \mathbf{R}_{B1}$

$1.19475699702860342183624993356068617422727135871410461156554659513222 \times 10^{-15}$

$\phi \mathbf{minimumnegaton} = 2 * \mathbf{R}_{mB}$

$2.2104973003410087466138263684176245307499612502464839557869551436 \times 10^{-20}$

$\phi \mathbf{orbit} = 2 * \mathbf{r}$

$3.5878696268388257509360126978858630815018788884428148132545201710985 \times 10^{-15}$

$\phi \mathbf{maximumorbit} = 2 * (\mathbf{r} + \mathbf{R}_{HB})$

$5.9727818139974473186105655086204638621440968752277699159421025022609 \times 10^{-15}$

$\phi \mathbf{minimumorbit} = 2 * (\mathbf{r} + \mathbf{R}_{mB})$

$3.5878917318118291610234788361495472577471863880553172780940780406500 \times 10^{-15}$

Bindig Forces in the Antiproton

Attraction force that positon A exerts over negatons B according to (89)

$$FAB = \delta_A * \delta_B * \frac{Aspin_A}{Aspin_B} * \frac{k * e^2}{r^2 - R_{B1}{}^2}$$

-80.6292335182364760695709169624154281053850881515231229220401827158 89

Repulsive force that negatons B exert among each other according to (90)

$$FBB = \delta_B * \delta_B * \frac{k * e^2}{(2 * r)^2 - R_{B1}{}^2}$$

18.433102031513538032493187574266798496190114215980531296004793436706

Centrifugal force in negatons B according to (91)

$$FC = \frac{L^2}{m_B * r^3}$$

62.196131486722938037077729388148629609194973935542591626035389279183

Equilibrium of the forces

$$\frac{-FAB}{FBB + FC}$$

1.0000000000000000000000000000000000000000000000000000000000000000000