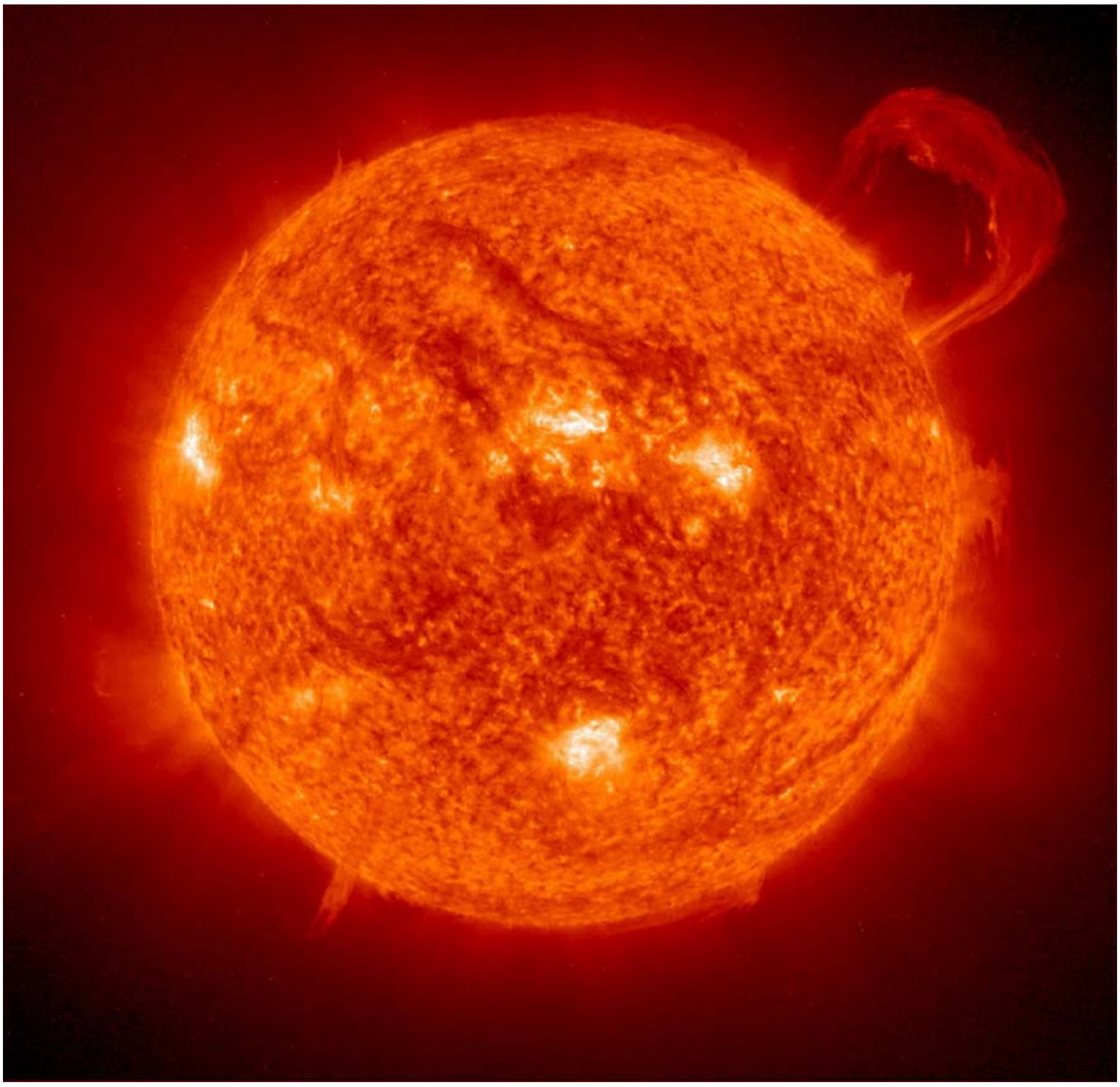
THE HYDROGEN FAMILY

STABILITY and GYROMAGNETIC RATIOS

Daniel Eduardo Caminoa Lizarralde
Cordoba, Argentina, 2/6/2007



Original title: **THE HYDROGEN FAMILY**

STABILITY and GYROMAGNETIC RATIOS.

Image of the cover: **SUN - Handle-shaped Prominence**

PIA03149: Extreme Ultraviolet Imaging Telescope (EIT) image of a huge, handle-shaped prominence taken on Sept. 14,1999 taken in the 304 angstrom wavelength.

Credit: NASA Jet Propulsion Laboratory (NASA-JPL)

Prologue

The final objective that accomplishes the first work is to find the laws that regulate the continuous nuclear fusion with elementary substances of hydrogen family.

I have given the first step with the publication of *"QEDa Theory – The atom and their nucleus"*. The second step is the current work with the publication of the laws that regulate the nuclear stability of hydrogen family. I will give the third step: it is prepared the edition of the laws that regulate the nuclear stability of Helium family.

I have suffered a delay of more than six months due to the intense analysis work that I should carry out to determine the origins of what today we know as "*nuclear strong interaction*". In this work, you will see this interaction on page 12 and 14, with the name of "*the spin magnetic interaction*" and with enormous magnitude. Incredibly, for my surprise, this interaction was being of magnetic origin instead of electrostatics.

In the opportunity of writing the *"QEDa Theory – The atom and their nucleus"* was to me impossible to determine the origin of "*nuclear strong interaction*". For this reason I applied the energy expressions as the only way to determine the equilibrium state of the nucleus of elementary substances, producing considerable errors in atomic substances of low number that now I correct it with this report.

Due to the necessity to solve in definitive form and to determine the laws that govern inside the nuclear field, for the better future in our descendants, I expect if it possible the experimental confirmation or correction, starting from the gyro-magnetic magnitudes of the hydrogen 1, because the smallest adjustment possibility does not exist to the expressions published in this report (see the last paragraph of page 31).

I comment them that apparently we have not advanced much, regarding to the ancient Egyptian civilization, in that time the scientific knowledge remained privately protected in priests' hands. Now, the same thing happens again, nowadays the scientific reports with experimental data remain saved into official or private institutions with impossible access, or in bookstores or web sites with very high cost.

I apology the briefness of the report and my English usage.

Sincerely,

Cordoba – Argentine, February 6, 2007

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ATOMIC AND NUCLEAR STABILITY OF THE HYDROGEN FAMILY

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Stability of Hidrogen family

Initial note on hidrogen family stability

This publication correct and update the magnitudes given for hydrogen 1 $^{1}\boldsymbol{H}$, deuterium $^{2}\boldsymbol{H}$ and tritium $^{3}\boldsymbol{H}$ on the initial version of "*QEDa Theory – The atom and their nucleus.*"

Dimensional and constant units

The system of dimensional units that I use is the IS (International System).

I give the inertial mass of particles in function of the inertial mass of electron; therefore, I take as unit of the inertial mass of other particles in function of the electron's inertial mass. That derives from the analysis carried out in the first section of "*QEDa Theory – The atom and their nucleus*" . Is expressed the electric constant respecting classic and old expression. I use the values published by NIST – *National Institute of Standards and Technology* for**:** the constant of Planck, the constant of elementary charge, the magnetic constant and the speed of light.

Symbol	Constant	Assigned magnitude: Value	Dimensional units	
$\boldsymbol{h}$	Planck constant	6.6260693×10^{-34}	Joule $\times$ second	
$\boldsymbol{q}$	Elementary charge	1.60217653×10^{-19}	Coulomb	
$\boldsymbol{c}$	Speed of light in vacuum	$299,792,458.$	Meter $\times$ second^{-1}	
$\boldsymbol{k}_e$	Electric constant[1] ($\boldsymbol{c}^2\cdot10^{-7}$ exact)	$8.98755178736817550659...\times10^{9}$	Newton $\times$ meter^{2} $\times$ coulomb^{-2}	
μ_0	Magnetic constant[2] ($4\cdot\pi\cdot10^{-7}$ exact)	$1.25663706143591728850...\times10^{-6}$	Newton $\times$ ampere^{-2}	
$\boldsymbol{m}_e$	Inertial electron mass	9.1093826×10^{-31}	Kilogram	NIST
$\boldsymbol{m}_e$	Inertial electron mass[3]	$9.099726139675734...\times10^{-31}$	Kilogram	QEDa
$\boldsymbol{m}_p$	Inertial proton mass	1.67262171×10^{-27}	Kilogram	NIST
$\boldsymbol{m}_p$	Inertial proton mass ($\boldsymbol{m}_e\times$ 1,835. exact)	$1.669799746630497...\times10^{-27}$	Kilogram	QEDa
$\boldsymbol{m}_n$	Inertial negatron mass (Neutron mass – proton mass)	2.30557×10^{-30}	Kilogram	NIST
$\boldsymbol{m}_n$	Inertial negatron mass ($\boldsymbol{m}_e\times$ 3. exact)	$2.729917841902720...\times10^{-30}$	Kilogram	QEDa

Note: (1) The electric constant does not figure in NIST (it is exactly equal to the square of the speed of light, divided by the value of 10,000,000.).

(2) The magnetic constant figured in NIST as permeability of vacuum.

(3) The mass of the electron in QEDa was calculated starting from the value of the frequency of wave ($2.46606141318734(0.03)\times10^{15}$ Herz) for Lyman's quantum skip $^{1}\boldsymbol{s}\leftarrow{}^{2}\boldsymbol{s}$, with enormous precision, obtained by Udem, Huber, Gross, Reichert, Prevedelli, Weitz and Hansch. The calculation expression of the inertial mass of electron is (see on page 115 of *QEDa Theory – The atom and their nucleus* and note on page 15 of this report):

$$\boldsymbol{m}_e=\frac{8\cdot137^2\cdot\boldsymbol{h}\ (\text{J.s})\cdot2.46606141318724\times10^{15}\ (\text{Hz})}{3\cdot\boldsymbol{c}^2\left(\text{m.s}^{-1}\right)^2}= \qquad 1$$

$$=9.0997261396757339557649416876581015768157193769137267061 1564\times10^{-31}\ \text{kg.}$$

In the following sections**,** were calculated the magnitudes that are between parentheses with the physical constants published by NIST – *National Institute of Standards and Technology*. Were calculated the magnitudes that are not between parentheses with the new physical constants corrected in QEDa.

Hydrogen 1 stability

The hydrogen 1 (^1H) stability is dynamic-potential in accordance with N. Bohr has determined but with the proton forming their nucleus in cardinal orbit. For more detail, see "*QEDa Theory – The atom and their nucleus*".

The dynamic equilibrium of the two particles of hydrogen atom (one electron and one proton) is only given if they are the same exactly in magnitude, in the inertial electronic resultant, in the electric interaction between electron and proton resultant, and the inertial protonic orbital resultant.

Is established the inertial electronic resultant F_e^i by following relationship

$$\text{being} \quad \overline{v_e} = \frac{c \cdot Q_e^v}{\left(l_e^v\right)^2} \quad \text{and} \quad r_e = \frac{h \cdot Q_e^v}{2 \cdot \pi \cdot c \cdot m_e} \quad \therefore \quad F_e^i = \frac{m_e \cdot \left(\overline{v_e}\right)^2}{r_e} = \frac{m_e \cdot \left(\frac{c \cdot Q_e^v}{\left(l_e^v\right)^2}\right)^2}{\frac{h \cdot Q_e^v}{2 \cdot \pi \cdot c \cdot m_e}} = \frac{2 \cdot \pi \cdot c^3 \cdot m_e^2 \cdot Q_e^v}{h \cdot \left(l_e^v\right)^4} \qquad 2$$

where $\overline{v_e}$ is the medium tangential speed of electron, c is the speed of light, Q_e^v is the quantum vectorial number calculated for electron, l_e^v is quantum state of the electron (the bigger integer most closest whereby the value has been calculated), r_e is the orbit radius of electron, h is the constant of Planck and m_e is the inertial mass of electron.

Is established the electric interaction between the electron and the proton resultant F_{ep}^e by following relationship

$$F_{ep}^e = \frac{k_e \cdot q^2}{\left(r_e + d\right)^2} = \frac{k_e \cdot q^2}{\left(\frac{h \cdot Q_e^v}{2 \cdot \pi \cdot c \cdot m_e} + d\right)^2} \qquad 3$$

where k_e is the electric constant, q is the elementary charge and d is eccentricity of the center of proton's orbit cardinal radius.

Is established the inertial protonic orbital resultant F_{Op}^i by following relationship

$$\text{being} \quad \varpi = \frac{\overline{v_e}}{r_e} = \frac{\frac{c \cdot Q_e^v}{\left(l_e^v\right)^2}}{\frac{h \cdot Q_e^v}{2 \cdot \pi \cdot c \cdot m_e}} = \frac{2 \cdot \pi \cdot c^2 \cdot m_e}{h \cdot \left(l_e^v\right)^2} \quad \therefore \quad F_{Op}^i = m_p \cdot \varpi^2 \cdot d = \frac{4 \cdot \pi^2 \cdot c^4 \cdot m_e^2 \cdot m_p \cdot d}{h^2 \cdot \left(l_e^v\right)^4} \qquad 4$$

where ϖ is the angular velocity (the speed that always rotates) of the electron in orbit, in radians per second.

Then, equaling member to member these three resultants, this are given respectively by the expressions **2**, **3** and **4**, we obtain the expression **5** that enunciate to us as the dynamic necessary condition in function of the quantum vectorial number, so that both particles can remain in atomic orbital.

$$F_e^i = F_{ep}^e = F_{Op}^i \quad \therefore \quad \frac{2 \cdot \pi \cdot c^3 \cdot m_e^2 \cdot Q_e^v}{h \cdot \left(l_e^v\right)^4} = \frac{k_e \cdot q^2}{\left(\frac{h \cdot Q_e^v}{2 \cdot \pi \cdot c \cdot m_e} + d\right)^2} = \frac{4 \cdot \pi^2 \cdot c^4 \cdot m_e^2 \cdot m_p \cdot d}{h^2 \cdot \left(l_e^v\right)^4} \qquad 5$$

This last expression we allows to define a system of two equalities, the expressions **6** and **7**

$$\overbrace{\frac{2\pi\cdot c^3\cdot m_e^2\cdot Q_e^v}{h\cdot\left(l_e^v\right)^4}=\frac{k_e\cdot q^2}{\left(\frac{h\cdot Q_e^v}{2\cdot\pi\cdot c\cdot m_e}+d\right)^2}}^{\text{First expression}} \quad 6 \quad \text{and} \quad \overbrace{\frac{4\cdot\pi^2\cdot c^4\cdot m_e^2\cdot m_p\cdot d}{h^2\cdot\left(l_e^v\right)^4}=\frac{k_e\cdot q^2}{\left(\frac{h\cdot Q_e^v}{2\cdot\pi\cdot c\cdot m_e}+d\right)^2}}^{\text{Second expression}} \quad 7$$

Then, if we solve them, regarding the two unknown quantity that we have left, magnitude the quantum vectorial number and magnitude the eccentricity of center of proton's orbit cardinal radius, the results will be the following

$$Q_e^v=137\cdot\sqrt[3]{\frac{274\cdot\pi\cdot k_e\cdot q^2\cdot m_p^2}{c\cdot h\cdot\left(m_e+m_p\right)^2}}=\frac{136.93825632739532238701940514 1}{(136.93828754170610295659571420 4)} \quad \therefore \quad l_e^v=137 \quad 8$$

$$\text{and} \quad d=137\cdot\sqrt[3]{\frac{137\cdot k_e\cdot q^2\cdot h^2}{4\cdot\pi^2\cdot c^4\cdot m_p\cdot\left(m_e+m_p\right)^2}}=\frac{2.8848006364311425224821507135 8\times10^{-14}}{(2.8799342021032615301914321906 7\times10^{-14})}\ \text{meter} \quad 9$$

Then, in function of the quantum vectorial number calculated, the orbit radius of electron r_e is

$$\text{being} \quad r_e=\frac{h\cdot Q_e^v}{2\cdot\pi\cdot c\cdot m_e} \quad \therefore$$

$$r_e=\frac{137\cdot h}{2\cdot\pi\cdot c\cdot m_e}\cdot\sqrt[3]{\frac{274\cdot\pi\cdot k_e\cdot q^2\cdot m_p^2}{c\cdot h\cdot\left(m_e+m_p\right)^2}}=\frac{5.2936091678511369002340817938 4\times10^{-11}}{(5.2879988483626029927512733478 4\times10^{-11})}\ \text{meter} \quad 10$$

The magnitudes of interactions according to the quantum state of hydrogen 1 and the orbital radius of particles are:

- The inertial electronic resultant is:

$$F_e^i=\frac{2\cdot c^3\cdot m_e^2}{h}\sqrt[3]{\frac{2\cdot\pi^4\cdot k_e\cdot q^2\cdot m_p^2}{c\cdot h\cdot\left(l_e^v\right)^8\left(m_e+m_p\right)^2}}= \quad 11$$

$$=\frac{8.2240392209465669132825336399 4\times10^{-8}}{(8.2415047559604518079260271519 5\times10^{-8})}\ \text{Newtons}$$

- The electric interaction between electron and proton resultant is:

$$F_{ep}^e=\frac{2\cdot c^2\cdot k_e\cdot q^2\cdot m_e^2\cdot\sqrt[3]{2\cdot\pi^4}}{\left(l_e^v\right)^2\left(c\cdot m_e\cdot\sqrt[3]{\frac{h^2\cdot k_e\cdot q^2\cdot l_e^v}{c^4\cdot m_p\cdot\left(m_e+m_p\right)^2}}+h\cdot\sqrt[3]{\frac{k_e\cdot q^2\cdot l_e^v\cdot m_p^2}{c\cdot h\cdot\left(m_e+m_p\right)^2}}\right)^2}= \quad 12$$

$$=\frac{8.2240392209465602958376332157 2\times10^{-8}}{(8.2415047559604451904811267277 2\times10^{-8})}\ \text{Newtons}$$

- The inertial protonic orbital resultant is:

$$F_{Op}^i=\frac{2\cdot c^4\cdot m_p\cdot m_e^2}{h^2\cdot\left(l_e^v\right)^3}\sqrt[3]{\frac{2\cdot\pi^4\cdot k_e\cdot q^2\cdot h^2\cdot l_e^v}{c^4\cdot m_p\cdot\left(m_e+m_p\right)^2}}= \quad 13$$

$$=\frac{8.2240392209465735307274340641 6\times10^{-8}}{(8.2415047559604584253709275761 7\times10^{-8})}\ \text{Newtons}$$

These calculated values satisfy the conditions of the atomic equilibrium of hydrogen 1.

Deuterium nuclear stability

The nuclear stability of deuterium or hydrogen 2 (^{2}H) is also dynamic-potential. Two protons and one internal negatron form the nucleus and one more peripheral electron integrates the deuterium atom. All the orbits of deuterium belong and they are on oneself plane common to all of them. For more detail, see "*QEDa Theory – The atom and their nucleus*".

At nuclear level in deuterium, the following interactions exist.

Is established the electric interaction between protons resultant F_{pp}^{e} by following relationship:

$$F_{pp}^{e} = A \cdot \frac{k_e \cdot q^2}{4 \cdot r_p^2} = 2 \cdot \frac{k_e \cdot q^2}{4 \cdot r_p^2} = \frac{k_e \cdot q^2}{2 \cdot r_p^2} \qquad 14$$

where A is the masic number (protons quantity) and r_p is the orbit radius of proton.

Is established the spin magnetic interaction between protons resultant F_{pp}^{m} by following relationship:

$$F_{pp}^{m} = A \cdot \frac{\mu_0 \cdot m_p \cdot c^3 \cdot q^2 \cdot \left(l_p^v\right)^2 \cdot \sqrt{1 - \frac{4 \cdot c^2 \cdot \pi^2 \cdot m_p^2 \cdot r_p^2}{h^2 \cdot \left(l_p^v\right)^4}} \cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right]}{\pi^2 \cdot h \cdot r_p} =$$

$$= \frac{2 \cdot \mu_0 \cdot m_p \cdot c^3 \cdot q^2 \cdot \left(l_p^v\right)^2 \cdot \sqrt{1 - \frac{4 \cdot c^2 \cdot \pi^2 \cdot m_p^2 \cdot r_p^2}{h^2 \cdot \left(l_p^v\right)^4}} \cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right]}{\pi^2 \cdot h \cdot r_p} \qquad 15$$

where μ_0 is the magnetic constant, l_p^v is the quantum state of the protons (the bigger integer most closely whereby the value has been calculated) and m_p is the inertial mass of proton.

Is established the inertial protonic resultant F_p^i by following relationship:

$$F_p^i = A \cdot \frac{m_p \cdot \left(\overline{v_p}\right)^2}{r_p} = 2 \cdot \frac{m_p \cdot \left(\frac{c \cdot Q_p^v}{\left(l_p^v\right)^2}\right)^2}{r_p} = 2 \cdot \frac{m_p \cdot \left(\frac{c \cdot \frac{2 \cdot \pi \cdot c \cdot m_p \cdot r_p}{h}}{\left(l_p^v\right)^2}\right)^2}{r_p} = \frac{8 \cdot \pi^2 \cdot c^4 \cdot m_p^3 \cdot r_p}{h^2 \cdot \left(l_p^v\right)^4} \qquad 16$$

where $\overline{v_p}$ is the medium tangential speed of protons and Q_p^v is the quantum vectorial number calculated for protons.

Is established the inertial negatronic resultant F_n^i by following relationship:

$$F_n^i = \left(A - Z\right) \cdot \frac{m_n \cdot \left(\overline{v_n}\right)^2}{r_n} = 1 \cdot \frac{m_n \cdot c^2}{r_n} = \frac{m_n \cdot c^2}{r_n} \qquad 17$$

where Z is the atomic number, ($A - Z$) is negatrons quantity, $\overline{v_n}$ is the medium tangential speed of negatron (it is the speed of light to be on a smaller radius that the negatronic cardinal radius) and m_n is the inertial mass of negatron.

Stability of Hidrogen family

Is established the electric interaction between protons and negatron resultant F_{pn}^{e} by following relationship:

$$F_{pn}^{e}=(A-Z)\cdot\frac{4\cdot k_e\cdot q^2\cdot r_n\cdot r_p}{\left(r_n^2-r_p^2\right)^2}=1\cdot\frac{4\cdot k_e\cdot q^2\cdot r_n\cdot r_p}{\left(r_n^2-r_p^2\right)^2}=\frac{4\cdot k_e\cdot q^2\cdot r_n\cdot r_p}{\left(r_n^2-r_p^2\right)^2} \qquad 18$$

If the following condition is completed is given to the dynamic equilibrium of deuterium nucleus. Therefore, the nucleus will be in equilibrium and the particles will remain in orbit if the resultants of acting interactions are exactly equal. The electric interaction between protons resultant more the spin magnetic interaction between protons resultant, minus the inertial protonic resultant and minus the inertial negatronic resultant, it should be necessarily equal to zero. Is enunciated this condition for the protons in the next expression.

$$F_{pp}^{e}+F_{pp}^{m}-F_{p}^{i}-F_{n}^{i}=0 \qquad \text{then} \qquad 19$$

$$\frac{k_e\cdot q^2}{2\cdot r_p^2}+\frac{2\cdot\mu_0\cdot m_p\cdot c^3\cdot q^2\cdot\left(l_p^v\right)^2\cdot\sqrt{1-\frac{4\cdot c^2\cdot\pi^2\cdot m_p^2\cdot r_p^2}{h^2\cdot\left(l_p^v\right)^4}}\cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right]}{\pi^2\cdot h\cdot r_p}-\frac{8\cdot\pi^2\cdot c^4\cdot m_p^3\cdot r_p}{h^2\cdot\left(l_p^v\right)^4}-\frac{m_n\cdot c^2}{r_n}=0$$

Another condition that should be satisfied, it is the negatronic dynamic equilibrium. Is enunciated this condition for the only negatron in the following expression.

$$F_{n}^{i}-F_{pn}^{e}=0 \qquad \text{then} \qquad \frac{c^2\cdot m_n}{r_n}-\frac{4\cdot k_e\cdot q^2\cdot r_n\cdot r_p}{\left(r_n^2-r_p^2\right)^2}=0 \qquad 20$$

Then, if we solve this system of equations **19** and **20**, we can know the orbit radius of protons and quantum state; the results will be following

$$r_p=\frac{h\cdot k_{Dp}}{2\cdot\pi\cdot c\cdot m_p}\cdot\sqrt[3]{\frac{m_p\cdot A}{m_n\cdot(A-Z)}}=\frac{3.5531380132638592597529964780 5\times10^{-15}}{(3.2082573820617789888005796062 8\times10^{-15})}\ \text{meter} \qquad \text{then} \qquad 21$$

$$Q_p^v=\frac{2\cdot\pi\cdot c\cdot m_p\cdot r_p}{h}=k_{Dp}\cdot\sqrt[3]{\frac{m_p\cdot A}{m_n\cdot(A-Z)}}=\frac{16.866348332093942019582755165 2}{(15.254976018956476480070705292 7)} \quad \therefore \quad l_p^v=\frac{17.}{(16.)} \qquad 22$$

where r_p is the orbit radius of protons, k_{Dp} is a calculation constant for the protons of deuterium with the magnitude 1.3474988143033468368514604662 78 inside calculations of **NIST** and the magnitude 1.5770282102825576853177835801 03 for the calculations inside of **QEDa**, Q_p^v is the quantum vectorial number calculated for protons, l_p^v is the quantum state of the protons (the bigger integer most closest whereby the value has been calculated). In addition, the negatron results will be following:

$$r_n=\sqrt{\frac{r_p\cdot\left(2\cdot k_e\cdot q^2+c^2\cdot m_n\cdot r_p-2\sqrt{k_e\cdot q^2\left(k_e\cdot q^2+c^2\cdot m_n\cdot r_p\right)}\right)}{c^2\cdot m_n}}=\frac{h\cdot k_{Tn}}{2\cdot\pi\cdot c\cdot m_n}\cdot\sqrt[3]{\frac{m_n\cdot(A-Z)}{m_p\cdot A}}=$$

$$=\frac{2.1678734608531936045767406191 1\times10^{-15}}{(1.8335884686708223962591853152 0\times10^{-15})}\ \text{meter} \qquad 23$$

$$Q_n^r=\frac{h}{2\cdot\pi\cdot c\cdot m_n\cdot r_n}=\frac{1}{k_{Tn}\cdot\sqrt[3]{\frac{m_n\cdot(A-Z)}{m_p\cdot A}}}=$$

$$=\frac{59.439055082723548650847078533 8}{(83.209942309783329505989968311 0)} \quad \therefore \quad l_n^r=\frac{59.}{(83.)} \qquad 24$$

where r_n is the orbit radius of negatron, Q_n^r is the quantum radial number calculated for negatron and l_n^r is the quantum state of the negatron (the smaller integer most closest whereby the value has been calculated). k_{Dn} is a calculation constant for the negatron of deuterium with the magnitude 0.136052935504633404351082504036 inside calculations of **NIST** and the magnitude 0.179932538252258023003804510154 for the calculations inside of **QEDa**.

The magnitudes of the nuclear interactions according to the quantum state of the deuterium nucleus and the orbit radius of the nuclear particles are:

- The electric interaction between protons resultant is:

$$F_{pp}^{e} = \frac{k_e \cdot q^2}{2 \cdot r_p^2} = \frac{9.137091780727827128316675953 10}{(11.207112636662808213827702275 0)} \text{ Newtons.} \quad 25$$

- The spin magnetic interaction between protons resultant is:

$$F_{pp}^{m} = \frac{2 \cdot \mu_0 \cdot m_p \cdot c^3 \cdot q^2 \cdot \left(l_p^v\right)^2 \sqrt{1 - \frac{4 \cdot c^2 \cdot \pi^2 \cdot m_p^2 \cdot r_p^2}{h^2 \cdot \left(l_p^v\right)^4}} \cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right]}{\pi^2 \cdot h \cdot r_p} =$$

$$= \frac{391.759687523362231331702787429}{(434.572290347681530420231865719)} \text{ Newtons.} \quad 26$$

- The inertial protonic resultant is:

$$F_p^i = \frac{8 \cdot \pi^2 \cdot c^4 \cdot m_p^3 \cdot r_p}{h^2 \cdot \left(l_p^v\right)^4} = \frac{287.720072164989232987863942981}{(332.769149438082820324780186638)} \text{ Newtons.} \quad 27$$

- The inertial negatronic resultant is:

$$F_n^i = \frac{c^2 \cdot m_n}{r_n} = \frac{113.176707139100756194238783792}{(113.010253546261623114332905971)} \text{ Newtons.} \quad 28$$

- The electric interaction between protons and negatron resultant is:

$$F_{pn}^{e} = \frac{4 \cdot k_e \cdot q^2 \cdot r_n \cdot r_p}{\left(r_n^2 - r_p^2\right)^2} = \frac{113.176707139100784615948214196}{(113.010253546261623114332905971)} \text{ Newtons.} \quad 29$$

These calculated values satisfy the conditions of nuclear equilibrium, the magnitudes between parentheses correspond to calculations with constants from NIST.

$$F_{pp}^{e} + F_{pp}^{m} = F_p^i + F_n^i = \frac{400.896779304090}{(445.779402984344)} \text{ Newtons.}$$

$$\text{and} \qquad F_n^i = F_{pn}^{e} = \frac{113.176707139100}{(113.010253546261)} \text{ Newtons.} \quad 30$$

The calculations with high precision are:

1- Inside of **QEDa:**

$$r_p = 3.553138013263859259752996478052781254165871476190431827092 31 \times 10^{-15} \text{ meter.} \quad 31$$

$$r_n = 2.167873460853193604576740619106271340029938538893573365283 47 \times 10^{-15} \text{ meter.} \quad 32$$

$$k_{Dp} = 1.577028210282557685317783580103423446416854858398437500000 \text{ Dimensionless.} \quad 33$$

$$k_{Dn} = 0.179932538252258023003804510153713636100292205810546875000 \text{ Dimensionless.} \quad 34$$

2- Inside of **NIST:**

$$r_p = 3.208257382061778988880057960628013653386804508026420474191125 \times 10^{-15} \text{ meter.} \quad 35$$

$$r_n = 1.833588468670822396259185315198756774411644224267617030317 07 \times 10^{-15} \text{ meter.} \quad 36$$

$$k_{Dp} = 1.347498814303346836851460466277785599231719970703125000000 \text{ Dimensionless.} \quad 37$$

$$k_{Dn} = 0.136052935504633404351082504035730380564928054809570312500 \text{ Dimensionless.} \quad 38$$

Deuterium electronic stability

The electronic stability is also dynamic-potential. For more detail, see "*QEDa Theory – The atom and their nucleus*". The dynamic equilibrium of the electron exists if it is achieve in the following condition.

$$F_e^i - F_{Ne}^e = 0 \qquad \text{then} \qquad \frac{m_e \cdot \left(\overline{v_e}\right)^2}{r_e} - \frac{k_e \cdot q^2}{r_e^2} = 0 \qquad 39$$

And for QEDa we know

$$\overline{v_e} = \frac{c \cdot Q_e^v}{\left(l_e^v\right)^2} \qquad 40 \qquad\qquad r_e = \frac{h \cdot Q_e^v}{2 \cdot \pi \cdot c \cdot m_e} \qquad 41$$

where F_e^i is the inertial electronic resultant, F_{Ne}^e is the electric interaction between nucleus and electron resultant, r_e is the orbit radius of electron, Q_e^v is the quantum vectorial number calculated for electron, m_e is the inertial mass of electron, c is the speed of light, h is the constant of Planck and l_e^v is the quantum state of the electron (the bigger integer most closest whereby the value has been calculated).

Then, if we solve the system of equations **39**, **40** and **41** we can know the orbit radius of electron, the quantum state of electron and the medium tangential speed of electron, the results will be following

$$Q_e^v = \sqrt[3]{\frac{2 \cdot 137^4 \cdot \pi \cdot k_e \cdot q^2}{c \cdot h}} = \frac{136.98800231166896422392884707 08}{(136.988002311668964239288470708)} \qquad \text{and} \qquad l_e^v = 137. \qquad 42$$

$$r_e = \frac{1}{m_e} \cdot \sqrt[3]{\frac{137^4 \cdot k_e \cdot q^2 \cdot h^2}{4 \cdot \pi^2 \cdot c^4}} = \frac{5.29553219364011116441627811687 \times 10^{-11}}{(5.28991863026604050820322379395 \times 10^{-11})} \text{ meter} \qquad 43$$

$$\overline{v_e} = \sqrt[3]{\frac{2 \cdot \pi \cdot c^2 \cdot k_e \cdot q^2}{137^2 \cdot h}} = \frac{2.18807448076748475432395935059 \times 10^6}{(2.18807448076748475432395935059 \times 10^6)} \text{ m.s}^{-1} \qquad 44$$

These calculated electronic magnitudes are exactly valid for deuterium and tritium, except for hydrogen 1 that have a minor radial quantum state.

IMPORTANT: I have not considered the displacement of the nucleus on their center (d) or (r_{Op}) like in the hydrogen 1, because for the relation of nuclear mass and electronic mass have insignificant magnitude on their value.

The theoretic value of the wave frequency for the Lyman's quantum skip ${}^1S \leftarrow {}^2S$ of hidrogen 1, is (see on page 112 of *QEDa Theory – The atom and their nucleus*.):

$$f_{\text{Lyman}}\left({}^1S \leftarrow {}^2S\right) = \frac{c^2 \cdot m_e}{2 \cdot h \cdot 137^2}\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right) = \frac{c^2 \cdot m_e}{2 \cdot h \cdot 137^2}\left(\frac{1}{1^2} - \frac{1}{2^2}\right) = \frac{3 \cdot c^2 \cdot m_e}{8 \cdot h \cdot 137^2} =$$

$$= \frac{2.46606141318723950000000000000 \times 10^{15}}{(2.46867835174430450000000000000 \times 10^{15})} \text{ Herz.} \qquad 45$$

Note: The value calculated for **QEDa** is inside the limits specified by the value measured according obtained by Udem, Huber, Gross, Reichert, Prevedelli, Weitz and Hansch; meanwhile the magnitudes with **NIST** constants are far. This calculation shows that the electron mass in **QEDa** is correct.

Tritium nuclear stability

The stability of the tritium or hydrogen 3 (^3H) is also dynamic-potential. Three protons and two internal negatrons form the nucleus and one more peripheral electron integrates the tritium atom. All the orbits of the tritium belong and they are on two traverse planes, one of them common to two protons and two negatrons and one electron; and the other traverse plane for an isolated proton. For more detail, see "*QEDa Theory – The atom and their nucleus*".

In this case we have the same interactions that in deuterium, but with the addition of the electric interaction between negatrons due to the existence of two negatrons in their nucleus.

At nuclear level in the tritium, the following interactions exist. Is established the electric interaction between protons resultant F_{pp}^{e} by following relationship:

$$F_{pp}^{e} = A \cdot \frac{k_e \cdot q^2}{\left(\frac{2}{\sqrt{2}} \cdot r_p\right)^2} + \frac{k_e \cdot q^2}{4 \cdot r_p^2} = k_e \cdot q^2 \cdot \frac{5}{4 \cdot r_p^2} \qquad 46$$

where A is the masic number (quantity of protons) and r_p is the orbit radius of protons.

Is established the spin magnetic interaction between protons resultant F_{pp}^{m} by following relationship:

$$F_{pp}^{m} = \frac{2 \cdot \mu_0 \cdot m_p \cdot c^3 \cdot q^2 \cdot \left(l_p^v\right)^2 \cdot \sqrt{1 - \frac{4 \cdot c^2 \cdot \pi^2 \cdot m_p^2 \cdot r_p^2}{h^2 \cdot \left(l_p^v\right)^4}} \cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right]}{\pi^2 \cdot h \cdot r_p} \qquad 47$$

where μ_0 is the magnetic constant, l_p^v is the quantum state of the protons (the bigger integer most closely whereby the value has been calculated) and m_p is the inertial mass of proton.

Is established the inertial protonic resultant F_p^i by following relationship:

$$F_p^i = A \cdot \frac{m_p \cdot \left(\overline{v_p}\right)^2}{r_p} = 3 \cdot \frac{m_p \cdot \left(\frac{c \cdot Q_p^v}{\left(l_p^v\right)^2}\right)^2}{r_p} = 3 \cdot \frac{m_p \cdot \left(\frac{c \cdot \frac{2 \cdot \pi \cdot c \cdot m_p \cdot r_p}{h}}{\left(l_p^v\right)^2}\right)^2}{r_p} = \frac{12 \cdot \pi^2 \cdot c^4 \cdot m_p^3 \cdot r_p}{h^2 \cdot \left(l_p^v\right)^4} \qquad 48$$

where $\overline{v_p}$ is the medium tangential speed of protons and Q_p^v is the quantum vectorial number calculated for protons.

Is established the inertial negatronic resultant F_n^i by following relationship:

$$F_n^i = (A - Z) \cdot \frac{m_n \cdot \left(\overline{v_n}\right)^2}{r_n} = 2 \cdot \frac{m_n \cdot c^2}{r_n} = \frac{2 \cdot m_n \cdot c^2}{r_n} \qquad 49$$

where Z is the atomic number; then, ($A - Z$) is the negatrons quantity, $\overline{v_n}$ is the medium tangential speed of negatrons (it is the speed of light to be on a smaller radius that the negatronic cardinal radius) and m_n is the inertial mass of negatron.

Stability of Hidrogen family

Is established the electric interaction between protons and negatrons resultant F^{e}_{pn} by following relationship:

$$F^{e}_{pn}=(A-Z)\cdot\left(\frac{2\cdot k_e\cdot q^2}{(r_n-r_p)^2}-\frac{k_e\cdot q^2}{(r_n+r_p)^2}\right)=k_e\cdot q^2\cdot\left(\frac{4}{(r_n-r_p)^2}-\frac{2}{(r_n+r_p)^2}\right) \quad 50$$

Is established the electric interaction between negatrons resultant F^{e}_{nn} by following relationship:

$$F^{e}_{nn}=(A-Z)\cdot\frac{k_e\cdot q^2}{(2\cdot r_n)^2}=2\cdot\frac{k_e\cdot q^2}{4\cdot r_n^2}=\frac{k_e\cdot q^2}{2\cdot r_n^2} \quad 51$$

The dynamic equilibrium of the tritium nucleus exists if the following condition is completed. Therefore, the nucleus will be in equilibrium, and the particles will remain in orbit, if the following resultants of the acting interactions are exactly equal. The electric interaction between protons resultant F^{e}_{pp} minus the inertial protonic resultant F^{i}_{p} and more the spin magnetic interaction between protons resultant F^{m}_{pp}, it should be necessarily equal, to the inertial negatronic resultant F^{i}_{n} more the electric interaction between negatrons resultant F^{e}_{nn}. Is enunciated this condition in the next expression.

$$F^{e}_{pp}+F^{m}_{pp}-F^{i}_{p}-F^{i}_{n}-F^{e}_{nn}=0 \quad \text{then} \quad 52$$

$$\frac{5\cdot k_e\cdot q^2}{4\cdot r_p^2}+\frac{2\cdot\mu_0\cdot m_p\cdot c^3\cdot q^2\cdot(l^v_p)^2\cdot\sqrt{1-\frac{4\cdot c^2\cdot\pi^2\cdot m_p^2\cdot r_p^2}{h^2\cdot(l^v_p)^4}}\cdot Sin\left[\frac{\pi}{(l^v_p)^2}\right]}{\pi^2\cdot h\cdot r_p}-\frac{12\cdot\pi^2\cdot c^4\cdot m_p^3\cdot r_p}{h^2\cdot(l^v_p)^4}-\frac{2\cdot c^2\cdot m_n}{r_n}-\frac{k_e\cdot q^2}{2\cdot r_n^2}=0$$

Another condition that should be satisfied, it is the negatronic dynamic equilibrium. The inertial negatronic resultant F^{i}_{n} more the electric interaction between negatrons resultant F^{e}_{nn} it should be necessarily equal to the electric interaction between protons and negatrons resultant F^{e}_{pn}. Is enunciated this condition for the negatrons in the next expression.

$$F^{i}_{n}+F^{e}_{nn}-F^{e}_{pn}=0 \quad \text{then} \quad \frac{2\cdot c^2\cdot m_n}{r_n}+\frac{k_e\cdot q^2}{2\cdot r_n^2}-k_e\cdot q^2\left(\frac{4}{(r_n-r_p)^2}+\frac{2}{(r_n+r_p)^2}\right)=0 \quad 53$$

Then, if we solve this system of equations **52** and **53**, we can know the orbit radius of protons; the results will be show next:

$$r_p=\frac{h\cdot k_{Tp}}{2\cdot\pi\cdot c\cdot m_p}\cdot\sqrt[3]{\frac{m_p\cdot A}{m_n\cdot(A-Z)}}=\frac{5.749294788800877716469429146 29\times10^{-15}}{(5.292162186986683026566886931 88\times10^{-15})}\ \text{meter} \quad 54$$

$$\text{then} \quad Q^v_p=k_{Tp}\cdot\sqrt[3]{\frac{m_p\cdot A}{m_n\cdot(A-Z)}}=\frac{27.291258659196653724166026 2225}{(25.163756406298045220637504 8263)} \quad \therefore \quad l^v_p=\frac{28.}{(26.)} \quad 55$$

where k_{Tp} is a calculation constant for the proton of tritium inside the calculations in **NIST** with value of 2.446462597070415245781305202399, and for calculations inside of **QEDa** is 2.808589112264151754772001368110.

In addition, negatronic results will be show next:

$$r_n = \frac{h \cdot k_{Tn}}{2 \cdot \pi \cdot c \cdot m_n} \cdot \sqrt[3]{\frac{m_n \cdot (A-Z)}{m_p \cdot A}} = \frac{3.36090820604525654827179139671 \times 10^{-15}}{(2.91139383323200886771935674817 \times 10^{-15})} \text{ meter} \qquad 56$$

$$\text{then} \qquad Q_n^r = \frac{1}{k_{Tn} \cdot \sqrt[3]{\frac{m_n \cdot (A-Z)}{m_p \cdot A}}} = \frac{38.3397409724710556133686623070}{(52.4054110977518732283897406887)} \qquad \therefore \qquad l_n^r = \frac{38.}{(52.)} \qquad 57$$

where r_n is the orbit radius of negatrons, Q_n^r is the quantum radial number calculated for negatrons, l_n^r is the quantum state of negatrons (the smaller integer most closest whereby the value has been calculated), k_{Tn} is a calculation constant for the negatron of tritium with value of $0.196273090019089851976374916376$ inside the calculations in **NIST**, and for calculations inside of **QEDa** is $0.253446432930161058560969422615$.

The calculations with high precision are:

1- Inside of **QEDa:**

$$r_p = 5.74929478880087771646942914629344767161516253250422898927999 \times 10^{-15} \text{ meter.} \qquad 58$$

$$r_n = 3.36090820604525654827179139671467627876518999084715129503185 \times 10^{-15} \text{ meter.} \qquad 59$$

$$k_{Tp} = 2.80858911226415175477200136811006814241409301757812500000 \text{ Dimensionless.} \qquad 60$$

$$k_{Tn} = 0.253446432930161058560969422615016810595989227294921875000 \text{ Dimensionless.} \qquad 61$$

2- Inside of **NIST:**

$$r_p = 5.29216218698668302656688693187917861692983912716359877725721 \times 10^{-15} \text{ meter.} \qquad 62$$

$$r_n = 2.91139383323200886771935674817388444202488050455654629262474 \times 10^{-15} \text{ meter.} \qquad 63$$

$$k_{Tp} = 2.44646259707041524578130520239938050508499145507812500000 \text{ Dimensionless.} \qquad 64$$

$$k_{Tn} = 0.196273090019089851976374916375789325684309005737304687500 \text{ Dimensionless.} \qquad 65$$

The magnitudes of the nuclear interactions according to the quantum state of tritium nucleus and the orbit radius of nuclear particles are:

- ❖ The of electric interaction between protons resultant is:

$$F_{pp}^e = \frac{5 \cdot k_e \cdot q^2}{4 \cdot r_p^2} = \frac{8.72454918957645908506037812913}{(10.2968849240732200911452309811)} \text{ Newtons.} \qquad 66$$

- ❖ The spin magnetic interaction between protons resultant is:

$$F_{pp}^m = \frac{2 \cdot \mu_0 \cdot m_p \cdot c^3 \cdot q^2 \cdot \left(l_p^v\right)^2 \sqrt{1 - \frac{4 \cdot c^2 \cdot \pi^2 \cdot m_p^2 \cdot r_p^2}{h^2 \cdot \left(l_p^v\right)^4}} \cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right]}{\pi^2 \cdot h \cdot r_p} =$$

$$= \frac{242.383032993947438171744579449}{(263.741682526252191109961131588)} \text{ Newtons.} \qquad 67$$

❖ The inertial protonic resultant is:

$$F_p^i = \frac{12\cdot\pi^2\cdot c^4\cdot m_p^3\cdot r_p}{h^2\cdot\left(l_p^v\right)^4} = \frac{94.891536745554802223523438442 5}{(118.082298335440242453842074610)} \text{ Newtons.} \quad 68$$

❖ The inertial negatronic resultant is:

$$F_n^i = \frac{2\cdot c^2\cdot m_n}{r_n} = \frac{146.003856548236143453323165886}{(142.347143405162455565005075186)} \text{ Newtons.} \quad 69$$

❖ The electric interaction between protons and negatrons resultant is:

$$F_{pn}^e = 2\cdot k_e\cdot q^2\left(\frac{2}{\left(r_n-r_p\right)^2}\cdot\frac{1}{\left(r_n+r_p\right)^2}\right) = \frac{156.216045437969057729787891731}{(155.956269114885259341463097371)} \text{ Newtons.} \quad 70$$

❖ The electric interaction between negatrons resultant is:

$$F_{nn}^e = \frac{k_e\cdot q^2}{2\cdot r_n^2} = \frac{10.2121888897328947365394924418}{(13.6091257097227931183169857832)} \text{ Newtons.} \quad 71$$

These calculated values satisfy the conditions of nuclear equilibrium, the magnitudes between parentheses correspond to calculations with **NIST** constants.

$$F_{pp}^e + F_{pp}^m = F_p^i + F_n^i + F_{nn}^e = \frac{251.107582183523}{(274.038567450325)} \text{ Newtons.}$$

$$\text{and} \qquad F_n^i + F_{nn}^e = F_{pn}^e = \frac{156.216045437969}{(155.956269114885)} \text{ Newtons.} \quad 72$$

Tritium electronic stability

The electronic stability of tritium is also dynamic-potential and exactly equal in magnitudes to deuterium. For more detail, see the *Deuterium electronic stability* section on page 15.

Note: *All the calculations carried out in this study are only valid for atoms of elementary substances taken in isolated form and without any external influence to them.*

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GYROMAGNETIC RATIOS OF

HYDROGEN 1 and ELEMENTARY PARTICLES

Glacier Perito Moreno - Santa Cruz - Argentina Credit: **Robert S.Flaum** fl. United States (STOCKXPERT-446759)

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Gyromagnetic ratios of Hydrogen 1 and elementary particles

Initial note on gyromagnetic ratios of hidrogen 1

This publication correct and update the magnitudes given to hydrogen 1 $^{1}\boldsymbol{H}$ on the initial version of "*QEDa Theory – The atom and their nucleus.*"

The gyromagnetic ratios are the ratios of the magnetic dipole moment to the mechanical angular momentum.

Were calculated the magnitudes with corrected constants (see *"Atomic and nuclear stability of the Hydrogen family"* separate *"Dimensional and constant units"* on page 9). As always the magnitudes between parentheses correspond with constants known at the present (NIST – *National Institute of Standards and Technology*).

Quantum states and orbit radius of the hydrogen 1

To be able to work with angular and magnetic moments, before we need to know the magnitudes of the orbit radius and the medium tangential speeds of the two particles that integrate the hydrogen 1. Then, there is a summary of these summarized magnitudes of "*QEDa Theory – The atom and their nucleus*" and "*Atomic and nuclear stability of the Hydrogen family*" on page 10.

Is established the quantum state of electron by following relationship

$$\boldsymbol{Q}_e^v = \frac{2\pi \cdot \boldsymbol{c} \cdot \boldsymbol{m}_e \cdot \boldsymbol{r}_e}{\boldsymbol{h}} = \frac{136.93825632739532238701940 5141}{(136.93828754170610295659571 4204)} \quad \therefore \quad \boldsymbol{l}_e^v = \frac{137.}{(137.)} \qquad 73$$

where $\boldsymbol{Q}_e^v$ is the quantum vectorial number calculated for electron, $\boldsymbol{c}$ is the speed of light, $\boldsymbol{m}_e$ is the inertial mass of electron, $\boldsymbol{r}_e$ is the orbit radius of electron, $\boldsymbol{h}$ is the constant of Planck and $\boldsymbol{l}_e^v$ is the quantum state of the electron (the bigger integer most closely whereby the value has been calculated).

Is established the quantum state of proton by following relationship

$$\boldsymbol{Q}_p^v = \frac{2\pi \cdot \boldsymbol{c} \cdot \boldsymbol{m}_p \cdot \boldsymbol{r}_p^{cd}}{\boldsymbol{h}} = \frac{1.}{(1.)} \quad \therefore \quad \boldsymbol{l}_p^v = \frac{1.}{(1.)} \qquad 74$$

where $\boldsymbol{Q}_p^v$ is the quantum vectorial number calculated for proton, $\boldsymbol{m}_p$ is the inertial mass of proton, $\boldsymbol{r}_p^{cd}$ is the cardinal orbit radius of proton (according to the expression **78**) and $\boldsymbol{l}_p^v$ is the quantum state of the proton (with the number one because the proton rotates in the orbit of protonic cardinal radius).

Is given the orbit radius of electron to

$$\boldsymbol{r}_e = \frac{\boldsymbol{h} \cdot \boldsymbol{Q}_e^v}{2 \cdot \pi \cdot \boldsymbol{c} \cdot \boldsymbol{m}_e} = \frac{5.29360916785113690023408179384 \times 10^{-11}}{(5.28799884836260299275127334784 \times 10^{-11})} \text{ meter} \qquad 75$$

The protonic cardinal orbit rotates displaced forming a nuclear orbit with a shift given by the following expression

radius of the proton orbital (displacement)

$$\boldsymbol{r}_{Op} = 137 \cdot \sqrt[3]{\frac{137 \cdot \boldsymbol{k}_e \cdot \boldsymbol{q}^2 \cdot \boldsymbol{h}^2}{4 \cdot \pi^2 \cdot \boldsymbol{c}^4 \cdot \boldsymbol{m}_p \cdot (\boldsymbol{m}_e + \boldsymbol{m}_p)^2}} = \frac{2.88480063643114252248215071358 \times 10^{-14}}{(2.87993420210326153019143219067 \times 10^{-14})} \text{ meter} \qquad 76$$

Is given the orbit radius of electron spin $\boldsymbol{r}_{se}$ to

$$\boldsymbol{r}_{se} = \frac{\boldsymbol{h}}{2 \cdot \pi \cdot \boldsymbol{c} \cdot \boldsymbol{m}_e} \sqrt{1 - \frac{(\boldsymbol{Q}_e^v)^2}{(\boldsymbol{l}_e^v)^4}} = \frac{3.86558761226789518564423688402 \times 10^{-13}}{(3.86148987090892843649257416908 \times 10^{-13})} \text{ meter} \qquad 77$$

Functionally, can be considered, the protonic cardinal orbit as if was the spin of the particle, and is given to

$$r_p^{cd} = r_{sp} = \frac{h}{2 \cdot \pi \cdot c \cdot m_p} = \frac{2.1066433251012674488105105 4104 \times 10^{-16}}{(2.1030891022542830279086888 2685 \times 10^{-16})} \text{ meter} \quad 78$$

Is given the medium tangential speed of electron to

$$\overline{v_e} = c \cdot \frac{Q_e^v}{(l_e^v)^2} = \frac{2.1872799008271028287708759 3079 \times 10^6}{(2.1872803994053411297500133 5144 \times 10^6)} \text{ meter.second}^{-1} \quad 79$$

Is given the medium tangential speed of proton in cardinal orbit to

$$\overline{v_{Op}} = \frac{2 \cdot \pi \cdot k_e \cdot m_e \cdot m_p}{h \cdot (m_e + m_p)^2} = \frac{1190.90397935632040571363177150}{(1190.15719284144734047004021704)} \text{ meter.second}^{-1} \quad 80$$

Is given the medium tangential speed of electron spin to

$$\overline{v_{se}} = c \cdot \sqrt{1 - \frac{(Q_e^v)^2}{(l_e^v)^4}} = \frac{2.9978447871815711259841918 9453 \times 10^8}{(2.9978447871451938152313232 4219 \times 10^8)} \text{ meter.second}^{-1} \quad 81$$

Functionally, the traverse vector on the electronic orbit plane of the proton in cardinal orbit can be considered as if was the medium tangential speed of orbital protonic spin, them:

$$\overline{v_{sp}} = \sqrt{c^2 - \frac{4 \cdot \pi^2 \cdot k_e^2 \cdot q^4 \cdot m_e^2 \cdot m_p^2}{h^2 \cdot (m_e + m_p)^4}} = \frac{2.9979245799763458967208862 3047 \times 10^8}{(2.9979245799763756990432739 2578 \times 10^8)} \text{ meter.second}^{-1} \quad 82$$

The orbital angular momentum of Hydrogen 1 particles

With the purpose of facilitate the calculations, we will carry out them in function of the quantum states of atomic particles.

Is given the orbital angular momentum of electron φ_{oe} by

$$\varphi_{oe} = m_e \cdot \overline{v_e} \cdot r_e = \frac{h \cdot Q_e^2}{2 \cdot \pi \cdot l_e^2} = \frac{1.0536213399413914316619523 1563 \times 10^{-34}}{(1.0536218202756471852571110 0374 \times 10^{-34})} \text{ kg.m}^2\text{.s}^{-1}. \quad 83$$

Is given the orbital angular momentum of proton orbit φ_{op} by

$$\varphi_{op} = m_p \cdot \overline{v_{Op}} \cdot r_{Op} = \frac{2 \cdot \pi \cdot k_e^2 \cdot q^4 \cdot m_e^2 \cdot m_p^2 \cdot l_e^2}{c^2 \cdot h \cdot (m_e + m_p)^4} =$$

$$= \frac{5.7366313565834234165701284 3483 \times 10^{-38}}{(5.7330353633520539670210451 3762 \times 10^{-38})} \text{ kg.m}^2\text{.s}^{-1}. \quad 84$$

The spin angular momentum of Hydrogen 1 particles

Is given the spin angular momentum of electron φ_{se} by

$$\varphi_{se}=m_e\cdot\overline{v_{se}}\cdot r_{se}=m_e\cdot c\cdot\sqrt{1-\frac{\left(Q_e^v\right)^2}{\left(l_e^v\right)^4}}\cdot\frac{h}{2\cdot\pi\cdot c\cdot m_e}\cdot\sqrt{1-\frac{\left(Q_e^v\right)^2}{\left(l_e^v\right)^4}}=\frac{h}{2\cdot\pi}\cdot\left(1-\frac{\left(Q_e^v\right)^2}{\left(l_e^v\right)^4}\right)$$

$$=\frac{1.0545155461110614058796961 8956\times10^{-34}}{\left(1.05451554608546979069115181994\times10^{-34}\right)}\ \text{kg.m}^2.\text{s}^{-1}. \qquad 85$$

Is given the spin angular momentum of protons φ_{sp} by

$$\varphi_{sp}=m_p\cdot\overline{v_{Op}}\cdot r_{Op}=\frac{h\cdot m_p}{2\cdot\pi\cdot c\cdot m_e}\sqrt{c^2-\frac{4\cdot\pi^2\cdot k_e^2\cdot q^4\cdot m_e^2\cdot m_p^2}{h^2\cdot\left(m_e+m_p\right)^4}}=$$

$$=\frac{1.05457168235613420175278655588\times10^{-34}}{\left(1.05457168235614467899045011729\times10^{-34}\right)}\ \text{kg.m}^2.\text{s}^{-1}. \qquad 86$$

The magnetic dipole moment

For the calculation of the magnetic dipole moments, it will be used the following properties

(a) The electronic nodal frequency of passage f_e is

$$f_e=\frac{\overline{v_e}}{2\cdot\pi\cdot r_e}=\frac{c\cdot\dfrac{Q_e^v}{\left(l_e^v\right)^2}}{2\cdot\pi\cdot\dfrac{h\cdot Q_e^v}{2\cdot\pi\cdot c\cdot m_e}}=\frac{c^2\cdot m_e}{h\cdot\left(l_e^v\right)^2} \qquad 87$$

(b) The protonic orbital nodal frequency of passage f_{Op} is

$$f_{Op}=\frac{\overline{v_{Op}}}{2\cdot\pi\cdot r_{Op}}=\frac{\dfrac{2\cdot\pi\cdot k_e\cdot m_e\cdot m_p}{h\cdot\left(m_e+m_p\right)^2}}{\dfrac{137^2\cdot k_e\cdot q^2\cdot h^2}{c^2\cdot\left(m_e+m_p\right)^2}}=\frac{2\cdot\pi\cdot c^2\cdot m_e}{h\cdot\left(l_e^v\right)^2} \qquad 88$$

(c) The electronic spin frequency of passage f_{se} is

$$f_{se}=\frac{\overline{v_{se}}}{2\cdot\pi\cdot r_{se}}=\frac{c\cdot\sqrt{1-\dfrac{\left(Q_e^v\right)^2}{\left(l_e^v\right)^4}}}{\dfrac{h}{c\cdot m_e}\sqrt{1-\dfrac{\left(Q_e^v\right)^2}{\left(l_e^v\right)^4}}}=\frac{c^2\cdot m_e}{h} \qquad 89$$

(d) The protonic orbital spin frequency of passage f_{sp} is

$$f_{sp}=\frac{\overline{v_{sp}}}{2\cdot\pi\cdot r_{sp}}=\frac{\sqrt{c^2-\dfrac{4\cdot\pi^2\cdot k_e^2\cdot q^4\cdot m_e^2\cdot m_p^2}{h^2\cdot\left(m_e+m_p\right)^4}}}{2\cdot\pi\cdot\dfrac{h}{2\cdot\pi\cdot c\cdot m_p}}=\frac{c\cdot m_p}{h}\sqrt{c^2-\frac{4\cdot\pi^2\cdot k_e^2\cdot q^4\cdot m_e^2\cdot m_p^2}{h^2\cdot\left(m_e+m_p\right)^4}} \qquad 90$$

(e) The electronic nodal electric intensity I_e is

$$I_e = f_e \cdot (-q) = \frac{c^2 \cdot m_e}{h \cdot (l_e^v)^2} \cdot (-q) = \frac{-q \cdot c^2 \cdot m_e}{h \cdot (l_e^v)^2} \qquad 91$$

(f) The protonic orbital nodal electric intensity I_p is

$$I_p = f_{Op} \cdot q = \frac{2 \cdot \pi \cdot c^2 \cdot m_e}{h \cdot (l_e^v)^2} \cdot q = \frac{2 \cdot \pi \cdot c^2 \cdot q \cdot m_e}{h \cdot (l_e^v)^2} \qquad 92$$

(g) The electronic spin electric intensity I_{se} is

$$I_{se} = f_{se} \cdot (-q) = \frac{c^2 \cdot m_e}{h} \cdot (-q) = \frac{-q \cdot c^2 \cdot m_e}{h} \qquad 93$$

(h) The protonic orbital spin electric intensity I_{sp} is

$$I_{sp} = f_{sp} \cdot q = \frac{c \cdot m_p}{h} \sqrt{c^2 - \frac{4 \cdot \pi^2 \cdot k_e^2 \cdot q^4 \cdot m_e^2 \cdot m_p^2}{h^2 \cdot (m_e + m_p)^4}} \cdot q = \frac{c \cdot q \cdot m_p}{h} \sqrt{c^2 - \frac{4 \cdot \pi^2 \cdot k_e^2 \cdot q^4 \cdot m_e^2 \cdot m_p^2}{h^2 \cdot (m_e + m_p)^4}} \qquad 94$$

(i) The electronic orbital area that should be considered $\mathcal{A}_e$ is

$$\mathcal{A}_e = \pi \cdot r_e^2 = \pi \cdot \left(\frac{h \cdot Q_e^v}{2 \cdot \pi \cdot c \cdot m_e} \right)^2 = \frac{h^2 \cdot (Q_e^v)^2}{4 \cdot \pi \cdot c^2 \cdot m_e^2} \qquad 95$$

(j) The protonic orbital area that should be considered $\mathcal{A}_p$ is

$$\mathcal{A}_p = \pi \cdot r_{Op}^2 = \pi \cdot \left(\frac{137^2 \cdot k_e \cdot q^2 \cdot h^2}{c^2 \cdot (m_e + m_p)^2} \right)^2 = \frac{137^4 \cdot \pi \cdot k_e^2 \cdot q^4 \cdot h^4}{c^4 \cdot (m_e + m_p)^4} \qquad 96$$

(k) The electronic spin area that should be considered $\mathcal{A}_{se}$ is

$$\mathcal{A}_{se} = \pi \cdot r_{se}^2 = \pi \cdot \left(\frac{h}{2 \cdot \pi \cdot c \cdot m_e} \sqrt{1 - \frac{(Q_e^v)^2}{(l_e^v)^4}} \right)^2 = \frac{h^2 \cdot \left(1 - \frac{(Q_e^v)^2}{(l_e^v)^4} \right)}{4 \cdot \pi \cdot c^2 \cdot m_e^2} \qquad 97$$

(l) The protonic orbital spin area that should be considered $\mathcal{A}_{sp}$ is

$$\mathcal{A}_{sp} = \pi \cdot r_{sp}^2 = \pi \cdot \left(\frac{h}{2 \cdot \pi \cdot c \cdot m_p} \right)^2 = \frac{h^2}{4 \cdot \pi \cdot c^2 \cdot m_p^2} \qquad 98$$

The orbital magnetic dipole moment of hydrogen 1

Is given the orbital magnetic dipole moment of the electron η_{oe} by

$$\eta_{oe} = I_e \cdot \mathcal{A}_e = \frac{-q \cdot c^2 \cdot m_e}{h \cdot (l_e^v)^2} \cdot \frac{h^2 \cdot (Q_e^v)^2}{4 \cdot \pi \cdot c^2 \cdot m_e^2} = \frac{-q \cdot h}{4 \cdot \pi \cdot m_e} \cdot \frac{(Q_e^v)^2}{(l_e^v)^2} =$$

$$= \frac{-9.27548453904022173378802325093 \times 10^{-24}}{(-9.26565622538194439619272167569 \times 10^{-24})} \ \text{A.m}^2. \qquad 99$$

Is given the orbital magnetic dipole moment of proton η_{op} by

$$\eta_{op} = I_p \cdot \mathcal{A}_p = \frac{2 \cdot \pi \cdot c^2 \cdot q \cdot m_e}{h \cdot (l_e^v)^2} \cdot \frac{137^4 \cdot \pi \cdot k_e^2 \cdot q^4 \cdot h^4}{c^4 \cdot (m_e + m_p)^4} = \frac{2 \cdot \pi^2 \cdot m_e \cdot k_e^2 \cdot q^5 \cdot h^3 \cdot (l_e^v)^2}{c^2 \cdot (m_e + m_p)^4} =$$

$$= \frac{1.19441804488778938527719115887 \times 10^{-108}}{(1.18763835895690049314063148821 \times 10^{-108})} \ \text{A.m}^2. \qquad 100$$

Gyromagnetic ratios of Hydrogen 1 and elementary particles

The spin magnetic dipole moment of hydrogen 1

Is given the electronic spin magnetic dipole moment η_{se} by

$$\eta_{se} = \boldsymbol{I}_{se} \cdot \mathcal{A}_{se} = \frac{-\boldsymbol{q} \cdot \boldsymbol{c}^2 \cdot \boldsymbol{m}_e}{\boldsymbol{h}} \cdot \frac{\boldsymbol{h}^2 \cdot \left(1 - \frac{\left(\boldsymbol{Q}_e^v\right)^2}{\left(\boldsymbol{l}_e^v\right)^4}\right)}{4 \cdot \pi \cdot \boldsymbol{c}^2 \cdot \boldsymbol{m}_e^2} = \frac{-\boldsymbol{q} \cdot \boldsymbol{h}}{4 \cdot \pi \cdot \boldsymbol{m}_e} \cdot \left(1 - \frac{\left(\boldsymbol{Q}_e^v\right)^2}{\left(\boldsymbol{l}_e^v\right)^4}\right) =$$

$$= \frac{-9.28335662285920603937936764530 \times 10^{-24}}{\left(-9.27351574001443602131203583197 \times 10^{-24}\right)} \text{ A.m}^2. \qquad \textbf{101}$$

Is given the orbit protonic spin magnetic dipole moment η_{sp} by

$$\eta_{sp} = \boldsymbol{I}_{sp} \cdot \mathcal{A}_{sp} = \frac{\boldsymbol{c} \cdot \boldsymbol{q} \cdot \boldsymbol{m}_p}{\boldsymbol{h}} \sqrt{\boldsymbol{c}^2 - \frac{4 \cdot \pi^2 \cdot \boldsymbol{k}_e^2 \cdot \boldsymbol{q}^4 \cdot \boldsymbol{m}_e^2 \cdot \boldsymbol{m}_p^2}{\boldsymbol{h}^2 \cdot \left(\boldsymbol{m}_e + \boldsymbol{m}_p\right)^4}} \cdot \frac{\boldsymbol{h}^2}{4 \cdot \pi \cdot \boldsymbol{c}^2 \cdot \boldsymbol{m}_p^2} =$$

$$= \frac{\boldsymbol{q} \cdot \boldsymbol{h}}{4 \cdot \pi \cdot \boldsymbol{c} \cdot \boldsymbol{m}_p} \sqrt{\boldsymbol{c}^2 - \frac{4 \cdot \pi^2 \cdot \boldsymbol{k}_e^2 \cdot \boldsymbol{q}^4 \cdot \boldsymbol{m}_e^2 \cdot \boldsymbol{m}_p^2}{\boldsymbol{h}^2 \cdot \left(\boldsymbol{m}_e + \boldsymbol{m}_p\right)^4}} =$$

$$= \frac{5.05931924496662356458549820687 \times 10^{-27}}{\left(5.05078341555673575732950175838 \times 10^{-27}\right)} \text{ A.m}^2. \qquad \textbf{102}$$

Gyromagnetics ratios and Landé factors of elementary particles

The particles are isolated and inside the cardinal orbit (the quantum state is equal to one).

being

Magnetic moment are

electron (*) $$\eta_e = \frac{-\boldsymbol{q} \cdot \boldsymbol{h}}{4 \cdot \pi \cdot \boldsymbol{m}_e} = \frac{-9.28385081458700447554501073338 \times 10^{-24}}{\left(-9.27400940809613250885609365445 \times 10^{-24}\right)} \text{ J.T}^{-1} \qquad \textbf{103}$$

proton (*) $$\eta_p = \frac{\boldsymbol{q} \cdot \boldsymbol{h}}{4 \cdot \pi \cdot \boldsymbol{m}_p} = \frac{5.05931924500654258935686127733 \times 10^{-27}}{\left(5.05078341559653783533622613691 \times 10^{-27}\right)} \text{ J.T}^{-1} \qquad \textbf{104}$$

negatron $$\eta_n = \frac{-\boldsymbol{q} \cdot \boldsymbol{h}}{4 \cdot \pi \cdot \boldsymbol{m}_n} = \frac{-3.09461693819566815851500357780 \times 10^{-24}}{\left(-3.66419149860385025487982590073 \times 10^{-24}\right)} \text{ J.T}^{-1} \qquad \textbf{105}$$

(*) *Note important :*

*The magnetic moment of the electron and of the proton it coincides with the values of **CODATA 1986** and **NIST**, but with the name of Bohr magneton (μ_B) for the electron and of Nuclear magneton (μ_N) for the proton.*

Angular momentum (constant) are

$$\varphi_e = \varphi_p = \varphi_n = \frac{\boldsymbol{h}}{2 \cdot \pi} = \frac{1.05457168236445505284824557937 \times 10^{-34}}{\left(1.05457168236445505284824557937 \times 10^{-34}\right)} \text{ kg.m}^2.\text{s}^{-1} \qquad \textbf{106}$$

Gyromagnetic ratios of Hydrogen 1 and elementary particles

Gyromagnetic ratio of the electron is

$$\gamma_e = \frac{\eta_e}{\varphi_e} = \frac{\frac{-q \cdot h}{4 \cdot \pi \cdot m_e}}{\frac{h}{2 \cdot \pi}} = \frac{-q}{2 \cdot m_e} = \frac{-8.80343268251967926025390625000 \times 10^{10}}{(-8.79410054639707183837890625000 \times 10^{10})} \ \text{Hz.T}^{-1} \quad 107$$

Gyromagnetic ratio of the proton is

$$\gamma_p = \frac{\eta_p}{\varphi_p} = \frac{\frac{q \cdot h}{4 \cdot \pi \cdot m_p}}{\frac{h}{2 \cdot \pi}} = \frac{q}{2 \cdot m_p} = \frac{4.79751099864832684397697448730 \times 10^{7}}{(4.78941687896661236882209777832 \times 10^{7})} \ \text{Hz.T}^{-1} \quad 108$$

Gyromagnetic ratio of the negatron is

$$\gamma_n = \frac{\eta_n}{\varphi_n} = \frac{\frac{-q \cdot h}{4 \cdot \pi \cdot m_n}}{\frac{h}{2 \cdot \pi}} = \frac{-q}{2 \cdot m_n} = \frac{-2.93447756083989295959472656250 \times 10^{10}}{(-3.47457793517493896484375000000 \times 10^{10})} \ \text{Hz.T}^{-1} \quad 109$$

Landé factors are

being $g_x = \frac{2 \cdot m_x}{\pm q} \gamma_x \quad \therefore$ 110

electron $g_e = \frac{2 \cdot m_e}{-q} \gamma_e = \frac{2 \cdot m_e}{-q} \cdot \frac{-q}{2 \cdot m_e} = 1.$ 111

proton $g_p = \frac{2 \cdot m_p}{q} \gamma_p = \frac{2 \cdot m_p}{q} \cdot \frac{q}{2 \cdot m_p} = 1.$ 112

negatron $g_n = \frac{2 \cdot m_n}{-q} \gamma_n = \frac{2 \cdot m_n}{-q} \cdot \frac{-q}{2 \cdot m_n} = 1.$ 113

Gyromagnetic ratios of Hydrogen 1 and elementary particles

Orbital: Gyromagnetic ratios and Landé factors of hydrogen 1

Is given the gyromagnetic ratio γ_{Oe} and Landé factor g_{Oe} of the orbital electronic by

the resultant of the angular momentum is

$$\varphi_{Oe} = \sqrt{(\varphi_{oe})^2 + (\varphi_{se})^2} = \frac{1.4906780218980232264028916l197\times10^{-34}}{(1.4906783613834693177392061 4030\times10^{-34})} \text{ kg.m}^2\text{.s}^{-1} \quad 114$$

the resultant of the magnetic moment is

$$\eta_{Oe} = -\sqrt{(\eta_{oe})^2 + (\eta_{se})^2} = \frac{-1.3123083617090842837783063 2171\times10^{-23}}{(-1.3109175392344656957340630 0292\times10^{-23})} \text{ A.m}^2. \quad 115$$

then

$$\gamma_{Oe} = \frac{\eta_{Oe}}{\varphi_{Oe}} = \frac{-8.8034326825196777343750000 00000\times10^{10}}{(-8.7941005463970703125000000 00000\times10^{10})} \text{ Hz.T}^{-1} \quad 116$$

$$g_{Oe} = \frac{2\cdot m_e}{-q}\cdot\gamma_{Oe} = \frac{0.9999999999999998889776975 3748}{(0.9999999999999998889776975 3748)} \simeq 1. \quad 117$$

Is given the gyromagnetic ratio γ_{Op} and Landé factor g_{Op} of protonic orbital or nucleus by

the resultant of the angular momentum is

$$\varphi_{Op} = \sqrt{(\varphi_{op})^2 + (\varphi_{sp})^2} = \frac{1.0545718383860060132266864 5863\times10^{-34}}{(1.0545718381904639811822197 3665\times10^{-34})} \text{ kg.m}^2\text{.s}^{-1}. \quad 118$$

the resultant of the magnetic moment is

$$\eta_{Op} = \sqrt{(\eta_{op})^2 + (\eta_{sp})^2} = \frac{5.0593192449666235645854982 0687\times10^{-27}}{(5.0507834155567357573295017 5838\times10^{-27})} \text{ A.m}^2. \quad 119$$

then

$$\gamma_{Op} = \frac{\eta_{Op}}{\varphi_{Op}} = \frac{4.7975102888294234871864318 8477\times10^{7}}{(4.7894161712333954870700836 1816\times10^{7})} \text{ Hz.T}^{-1} \quad 120$$

$$g_{Op} = \gamma_{Op}\cdot\frac{2\cdot m_p}{q} = \frac{0.9999998520443406091473548 25836}{(0.9999998522297735004116248 09203)} \simeq 1. \quad 121$$

Atom: Gyromagnetic ratios and Landé factors of hydrogen 1

Is given the gyromagnetic ratio γ_H and Landé factor g_H of hidrogen 1 atom by

the resultant of the angular momentum is

$$\varphi_H = \sqrt{(\varphi_{op} - \varphi_{oe})^2 + (\varphi_{sp} - \varphi_{se})^2} =$$

$$= \frac{1.0530476783019988076429732 1764\times10^{-34}}{(1.0530485182355777938179490 9706\times10^{-34})} \text{ kg.m}^2\text{.s}^{-1}. \quad 122$$

the resultant of the magnetic moment is

$$\eta_H = \sqrt{(\eta_{op} + \eta_{oe})^2 + (\eta_{sp} + \eta_{se})^2} =$$

$$= \frac{1.3119505108357916272713839 6723\times10^{-23}}{(1.3105602921600388433352509 2718\times10^{-23})} \text{ A.m}^2. \quad 123$$

then

$$\gamma_H = \frac{\eta_H}{\varphi_H} = \frac{1.2458605036300581359863281 2500\times10^{11}}{(1.2445393250787074279785156 2500\times10^{11})} \text{ Hz.T}^{-1} \quad 124$$

$$g_H = \frac{2(m_p + m_e)}{-q}\cdot\gamma_D = \frac{2598.3045104743132469593547 2846}{(2599.9347182581473134632688 0157)} \quad 125$$

Gyromagnetic ratios of Hydrogen 1 and elementary particles

Summary of hidrogen 1

It is regrettable on this Physics field contains very few variables to compare with the obtained data of experimental physics, whereby it does not carry out any comparison or whatever comment.

First part - Calculations performed according to constants of NIST

Table 1: Gyromagnetic ratios and Landé factor of elementary particles.

Particle	Gyromagnetic ratio $Hz.T^{-1}$	Measure unit	Landé factor
Electron	$-8.794100546397071838378906250000\times10^{10}$	$Hz.T^{-1}$	1.
Proton	$4.789416878966612368822097778320\times10^{7}$	$Hz.T^{-1}$	1.
Negatron	$-3.474577935174938964843750000000\times10^{10}$	$Hz.T^{-1}$	1.

Table 2: The orbital gyromagnetic ratios and Landé factor of Hydrogen 1.

Particle in orbit	Gyromagnetic ratio $Hz.T^{-1}$	Measure unit	Landé factor
Electron	$-8.794100546397070312500000000000\times10^{10}$	$Hz.T^{-1}$	$0.9999\approx1.$
Proton	$4.789416171233395487070083618160\times10^{7}$	$Hz.T^{-1}$	$0.9999\approx1.$

Table 4: The atomic gyromagnetic ratios and Landé factor of Hydrogen 1.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$1.244539325078707427978515625000\times10^{11}$	$Hz.T^{-1}$
Landé factor	2599.934718258147313463268801570	Dimensionless

Second part - Calculations carried out according to corrected constants.

Table 5: Gyromagnetic ratios and Landé factor of elementary particles.

Particle	Gyromagnetic ratio $Hz.T^{-1}$	Measure unit	Landé factor
Electron	$-8.803432682519679260253906250000\times10^{10}$	$Hz.T^{-1}$	1.
Proton	$4.797510998648326843976974487300\times10^{7}$	$Hz.T^{-1}$	1.
Negatron	$-2.934477560839892959594726562500\times10^{10}$	$Hz.T^{-1}$	1.

Table 6: The orbital gyromagnetic ratios and Landé factor of Hydrogen-1.

Particle in orbit	Gyromagnetic ratio $Hz.T^{-1}$	Measure unit	Landé factor
Electron	$-8.803432682519677734375000000000\times10^{10}$	$Hz.T^{-1}$	$0.9999\approx1.$
Proton	$4.797510288829423487186431884760\times10^{7}$	$Hz.T^{-1}$	$0.9999\approx1.$

Table 8: The atomic gyromagnetic ratios and Landé factor of Hydrogen 1.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$1.245860503630058135986328125000\times10^{11}$	$Hz.T^{-1}$
Landé factor	2598.304510474313246959354728460	Dimensionless

Gyromagnetic ratios of Hydrogen 1 and elementary particles

Important note:

According to **CODATA 1986**

The proton gyromagnetic ratio is $\gamma_p^{'}/2\pi = 4.2576375\times10^{7}$ uncorrected $\left(\mathrm{H_2O}\ ,\ \mathrm{sph.}\ ,\ 25^{\circ}\mathrm{C}\right)$, while the value calculated in theoretical form (expression **120**) is:

$$\gamma_p^{'}/2\pi \simeq \gamma_{Op} = 4.797510288829423487186431884 76\times10^{7}\ \mathrm{Hz.T^{-1}}. \quad [\text{QEDa Constants}]$$

and $$\gamma_p^{'}/2\pi \simeq \gamma_{Op} = \left(4.78941617123339548707008361816\times10^{7}\right)\ \mathrm{Hz.T^{-1}}. \quad [\text{NIST Constants}]$$

The shielded proton magnetic moment is $\mu_p^{'} = 1.41057138\times10^{-26}$ $\left(\mathrm{H_2O}\ ,\ \mathrm{sph.}\ ,\ 25^{\circ}\mathrm{C}\right)$, while the value calculated in theoretical form (expression **119**) is:

$$\mu_p^{'} \simeq \eta_{Op} = 5.05931924496662356458549820687\times10^{-27}\ \mathrm{A.m^2}. \quad [\text{QEDa Constants}]$$

and $$\mu_p^{'} \simeq \eta_{Op} = \left(5.05078341555673575732950175838\times10^{-27}\right)\ \mathrm{A.m^2}. \quad [\text{NIST Constants}]$$

In the determination of magnetic fields's magnitude and intensity in the Magnetic Resonance System especially, it is suitable to use a hydrogen 1 test-tube in the setup (*to avoid interactions among different atoms*) and use the gyromagnetic ratios values calculated for proton and electron (see expressions **116**, **120** and **124**).

This is because the calculated values are so much for NIST as well as QEDa, these can only suffer minimal corrections in the future.

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GYROMAGNETIC RATIOS OF

DEUTERIUM

Lake Nahuel Huapi - San Carlos de Bariloche - Argentina Credit: **Matías Pinasco** Buenos Aires, Argentina (STOCKXPERT 626729)

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Gyromagnetic ratios of Deuterium

Initial note on gyromagnetic ratios of deuterium

This publication correct and update the magnitudes given to deuterium on the initial version of "*QEDa Theory – The atom and their nucleus*."

Two protons and one internal negatron form the nucleus and plus one more peripheral electron integrate the deuterium atom. All the orbits of deuterium belong and they are on oneself plane common to all of them. For more information, see "*QEDa Theory – The atom and their nucleus*" and "*Atomic and nuclear stability of the Hydrogen family*" on page 12.

Were calculated the magnitudes with corrected constants (see *"Dimensional and constant units "* on page 9). The magnitudes between parentheses correspond with the constants known at the present (NIST – *National Institute of Standards and Technology*). In all the following calculations, have been calculated the magnitudes with high precision.

Quantum states and orbit radius of the deuterium

To be able to work with the angular and magnetic moments, before we need to know the magnitudes of the orbital radius and the tangential speeds of all deuterium particles. Then, there is a synopsis of these summarized magnitudes.

Is established the quantum state of electron by following relationship

$$Q_e^v = \frac{2\pi \cdot c \cdot m_e \cdot r_e}{h} = \frac{136.98800231166896423928847070 8}{(136.988002311668964239288470708)} \quad \therefore \quad l_e^v = \frac{137.}{(137.)} \qquad 126$$

where Q_e^v is the quantum vectorial number calculated for electron, c is the speed of light, m_e is the inertial mass of electron, r_e is the orbital radius of electron, h is the constant of Planck and l_e^v is quantum state of the electron (the bigger integer most closely whereby the value has been calculated).

Is established the quantum state of protons by following relationship

$$Q_p^v = \frac{2\pi \cdot c \cdot m_p \cdot r_p}{h} = \frac{16.8663483320939420195827551652}{(15.2549760189564764800707052927)} \quad \therefore \quad l_p^v = \frac{17.}{(16.)} \qquad 127$$

Where Q_p^v is the quantum vectorial number calculated for protons, m_p is the inertial mass of proton, r_p is the orbital radius of protons (according to expression **5**) and l_p^v is the quantum state of the protons (the bigger integer most closely whereby the value has been calculated).

Is established the quantum state of the negatron by following relationship

$$Q_n^r = \frac{h}{2 \cdot \pi \cdot c \cdot m_n \cdot r_n} = \frac{59.4390550827235486508470785338}{(83.2099423097833295059899683110)} \quad \therefore \quad l_n^r = \frac{59.}{(83.)} \qquad 128$$

Where Q_n^r is the quantum radial number calculated for negatron, m_n is the inertial mass of negatron, r_n is the orbital radius of negatron (according to expression **6**) and l_n^r is the quantum state of negatron (the smaller integer most closely whereby the value has been calculated).

Gyromagnetic ratios of Deuterium

Is given the radius of orbits to

electron $r_e = \dfrac{h \cdot Q_e^v}{2 \cdot \pi \cdot c \cdot m_e} = \dfrac{5.2955321936401111644162781168\,7 \times 10^{-11}}{(5.2899186302660405082032237939\,5 \times 10^{-11})}$ meter 129

protons $r_p = \dfrac{h \cdot Q_p^v}{2 \cdot \pi \cdot c \cdot m_p} = \dfrac{3.5531380132638592597529964780\,5 \times 10^{-15}}{(3.2082573820617789888005796062\,8 \times 10^{-15})}$ meter 130

negatron $r_n = \dfrac{h}{2 \cdot \pi \cdot c \cdot m_n \cdot Q_n^r} = \dfrac{2.1678734608531936045767406191\,1 \times 10^{-15}}{(1.8335884686708223962591853152\,0 \times 10^{-15})}$ meter 131

Is given the radius of spin r_{sx} (sub-index x identifies to the particle) to

electron $r_{se} = \dfrac{h}{2 \cdot \pi \cdot c \cdot m_e} \sqrt{1 - \dfrac{(Q_e^v)^2}{(I_e^v)^4}} = \dfrac{3.8655875374994980398253073867\,8 \times 10^{-13}}{(3.8614897962666465467002002468\,5 \times 10^{-13})}$ meter 132

protons $r_{sp} = \dfrac{h}{2 \cdot \pi \cdot c \cdot m_p} \sqrt{1 - \dfrac{(Q_p^v)^2}{(I_p^v)^4}} = \dfrac{2.1030526365444569705922080501\,4 \times 10^{-16}}{(2.0993518117464146902735629496\,3 \times 10^{-16})}$ meter 133

negatron $r_{sn} = \dfrac{h}{2 \cdot \pi \cdot c \cdot m_n \cdot (299{,}792{,}458.)} \sqrt{1 - \dfrac{1}{(Q_n^r)^2}} =$

$= \dfrac{4.2975768475949473719132890244\,5 \times 10^{-22} \text{ m.}}{(5.0889129590873442991143602597\,1 \times 10^{-22} \text{ m.})}$ meter 134

Is given the orbit medium tangential speed to

electron $v_e = c \cdot \dfrac{Q_e^v}{(I_e^v)^2} = \dfrac{2.1880744807674847543239593505\,9 \times 10^{6}}{(2.1880744807674847543239593505\,9 \times 10^{6})}$ m.s^{-1}. 135

protons $v_p = c \cdot \dfrac{Q_p^v}{(I_p^v)^2} = \dfrac{1.7496207695372469723224639892\,6 \times 10^{7}}{(1.7864557646304752677679061889\,6 \times 10^{7})}$ m.s^{-1}. 136

negatron $v_n = c = 299{,}792{,}458.$ m.s^{-1}. 137

Is given the spin medium tangential speed v_{sx} (sub-index x identifies to the particle) to

electron $v_{se} = c \cdot \sqrt{1 - \dfrac{(Q_e^v)^2}{(I_e^v)^4}} = \dfrac{2.9978447291971009969711303710\,9 \times 10^{8}}{(2.9978447291971009969711303710\,9 \times 10^{8})}$ m.s^{-1}. 138

protons $v_{sp} = c \cdot \sqrt{1 - \dfrac{(Q_p^v)^2}{(I_p^v)^4}} = \dfrac{2.9928147385022372007369995117\,2 \times 10^{8}}{(2.9925971238003891706466674804\,7 \times 10^{8})}$ m.s^{-1}. 139

negatron $v_{sn} = c \cdot \sqrt{1 - \dfrac{1}{(Q_n^r)^2}} = \dfrac{2.9975002754896295070648193359\,4 \times 10^{8}}{(2.9977080809737819433212280273\,4 \times 10^{8})}$ m.s^{-1}. 140

Gyromagnetic ratios of Deuterium

The orbital angular momentum of the particles in deuterium

With the purpose of facilitate the calculations; we will carry out them in function of the quantum state of atomic particles.

Is given the orbital angular momentum of electron φ_{oe} by

$$\varphi_{oe} = m_e \cdot v_e \cdot r_e = m_e \cdot \frac{c \cdot Q_e^v}{\left(l_e^v\right)^2} \cdot \frac{h^2}{4 \cdot \pi^2 \cdot q^2 \cdot k_e \cdot m_e} = \frac{c \cdot h^2 \cdot Q_e^v}{4 \cdot \pi^2 \cdot q^2 \cdot k_e \cdot \left(l_e^v\right)^2} =$$

$$= \frac{1.05438698355637042486953873494 \times 10^{-34}}{\left(1.05438698355637063869071554232 \times 10^{-34}\right)} \text{ kg.m}^2\text{.s}^{-1}. \qquad 141$$

Is given the orbital angular momentum of proton φ_{op} by

$$\varphi_{op} = 2 \cdot m_p \cdot v_p \cdot r_p = 2 \cdot m_p \cdot \frac{c \cdot Q_p^v}{\left(l_p^v\right)^2} \cdot \frac{h \cdot Q_p^v}{2 \cdot \pi \cdot c \cdot m_p} = \frac{h}{\pi}\left(\frac{Q_p^v}{l_p^v}\right)^2 =$$

$$= \frac{2.07611013693874054290554244597 \times 10^{-34}}{\left(1.91729612372420481086265622885 \times 10^{-34}\right)} \text{ kg.m}^2\text{.s}^{-1}. \qquad 142$$

Is given the orbital angular momentum of negatron φ_{on} by

$$\varphi_{on} = m_n \cdot v_n \cdot r_n = m_n \cdot c \cdot \frac{h}{2 \cdot \pi \cdot c \cdot m_n \cdot Q_n^r} = \frac{h}{2 \cdot \pi} \cdot \frac{1}{Q_n^r} =$$

$$= \frac{1.77420667420901689826607561768 \times 10^{-36}}{\left(1.26736259284783182034769009496 \times 10^{-36}\right)} \text{ kg.m}^2\text{.s}^{-1}. \qquad 143$$

The spin angular momentum of the particles in deuterium

Is given the spin angular momentum of electron φ_{se} by

$$\varphi_{se} = m_e \cdot v_{se} \cdot r_{se} = m_e \cdot c \cdot \sqrt{1 - \frac{\left(Q_e^v\right)^2}{\left(l_e^v\right)^4}} \cdot \frac{h}{2 \cdot \pi \cdot c \cdot m_e} \cdot \sqrt{1 - \frac{\left(Q_e^v\right)^2}{\left(l_e^v\right)^4}} = \frac{h}{2 \cdot \pi} \cdot \left(1 - \frac{\left(Q_e^v\right)^2}{\left(l_e^v\right)^4}\right) =$$

$$= \frac{1.05451550531807233925063097997 \times 10^{-34}}{\left(1.05451550531807255307180778735 \times 10^{-34}\right)} \text{ kg.m}^2\text{.s}^{-1}. \qquad 144$$

Is given the spin angular momentum of protons φ_{sp} by

$$\varphi_{sp} = 2 \cdot m_p \cdot v_{sp} \cdot r_{sp} = 2 \cdot m_p \cdot c \cdot \sqrt{1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}} \cdot \frac{h}{2 \cdot \pi \cdot c \cdot m_p} \cdot \sqrt{1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}} = \frac{h}{\pi} \cdot \left(1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right) =$$

$$= \frac{2.10195959262877595179382577646 \times 10^{-34}}{\left(2.10165392674561221349192621285 \times 10^{-34}\right)} \text{ kg.m}^2\text{.s}^{-1}. \qquad 145$$

Is given the spin angular momentum of negatron φ_{sn} by

$$\varphi_{sn} = m_n \cdot v_{sn} \cdot r_{sn} = m_n \cdot c \cdot \sqrt{1 - \frac{1}{\left(Q_n^r\right)^2}} \cdot \frac{h}{2 \cdot \pi \cdot c \cdot m_n \cdot (299{,}792{,}458.)} \sqrt{1 - \frac{1}{\left(Q_n^r\right)^2}} =$$

$$= \frac{h}{2 \cdot \pi \cdot (299{,}792{,}458.)} \cdot \left(1 - \frac{1}{\left(Q_n^r\right)^2}\right) =$$

$$= \frac{3.51667682923625599283158703285 \times 10^{-43}}{\left(3.51716444224391365021217792914 \times 10^{-43}\right)} \text{ kg.m}^2\text{.s}^{-1}. \qquad 146$$

Gyromagnetic ratios of Deuterium

The magnetic dipole moment

For the calculation of the magnetic dipole moments, it will be used the following properties

(a) The nodal frequency of particles passage f_x is

protons and electrons

$$f_{e,p} = \frac{v_{e,p}}{2\cdot\pi\cdot r_{e,p}} = \frac{c\cdot\frac{Q^v_{e,p}}{\left(l^v_{e,p}\right)^2}}{2\cdot\pi\cdot\frac{h\cdot Q^v_{e,p}}{2\cdot\pi\cdot c\cdot m_{e,p}}} = \frac{c^2\cdot m_{e,p}}{h\cdot\left(l^v_{e,p}\right)^2} \quad 147$$

negatrons

$$f_n = \frac{v_n}{2\cdot\pi\cdot r_n} = \frac{c}{2\cdot\pi\cdot\frac{h}{2\cdot\pi\cdot c\cdot m_n\cdot Q^r_n}} = \frac{c^2\cdot m_n\cdot Q^r_n}{h} \quad 148$$

(b) The spin frequency of particles passage f_{sx} is

protons and electrons

$$f_{se,sp} = \frac{v_{se,sp}}{2\cdot\pi\cdot r_{se,sp}} = \frac{c\cdot\sqrt{1-\frac{\left(Q^v_{e,p}\right)^2}{\left(l^v_{e,p}\right)^4}}}{2\cdot\pi\cdot\frac{h}{2\cdot\pi\cdot c\cdot m_{e,p}}\sqrt{1-\frac{\left(Q^v_{e,p}\right)^2}{\left(l^v_{e,p}\right)^4}}} = \frac{c^2\cdot m_{e,p}}{h} \quad 149$$

negatrons

$$f_{sn} = \frac{v_{sn}}{2\cdot\pi\cdot r_{sn}} = \frac{c\cdot\sqrt{1-\frac{1}{\left(Q^r_n\right)^2}}}{2\cdot\pi\cdot\frac{h}{2\cdot\pi\cdot c\cdot m_p\cdot(299,792,458.)}\sqrt{1-\frac{1}{\left(Q^r_n\right)^2}}} = \frac{c^2\cdot m_n\cdot(299,792,458.)}{h} \quad 150$$

(c) The nodal electric intensity I_x is

protons and electrons $$I_{e,p} = f_{e,p}\cdot(\pm q) = \frac{c^2\cdot m_{e,p}}{h\cdot\left(l^v_{e,p}\right)^2}\cdot(\pm q) = \frac{\pm q\cdot c^2\cdot m_{e,p}}{h\cdot\left(l^v_{e,p}\right)^2} \quad 151$$

negatrons $$I_n = f_n\cdot(-q) = \frac{c^2\cdot m_n\cdot Q^r_n}{h}\cdot(-q) = \frac{-q\cdot c^2\cdot m_n\cdot Q^r_n}{h} \quad 152$$

(d) The spin electric intensity I_{sx} is

protons and electrons $$I_{se,sp} = f_{se,sp}\cdot(\pm q) = \frac{c^2\cdot m_{e,p}}{h}\cdot(\pm q) = \frac{\pm q\cdot c^2\cdot m_{e,p}}{h} \quad 153$$

negatrons $$I_{sn} = f_{sn}\cdot(-q) = \frac{c^2\cdot m_n\cdot(299,792,458.)}{h}\cdot(-q) = \frac{-q\cdot c^2\cdot m_n\cdot(299,792,458.)}{h} \quad 154$$

(e) The orbital area that should be considered $\mathcal{A}_x$ is

protons and electrons

$$\mathcal{A}_{e,p} = \pi\cdot r^2_{e,p} = \pi\cdot\left(\frac{h\cdot Q^v_{e,p}}{2\cdot\pi\cdot c\cdot m_{e,p}}\right)^2 = \frac{h^2\cdot\left(Q^v_{e,p}\right)^2}{4\cdot\pi\cdot c^2\cdot m^2_{e,p}} \quad 155$$

negatrons

$$\mathcal{A}_n = \pi\cdot r^2_n = \pi\cdot\left(\frac{h}{2\cdot\pi\cdot c\cdot m_n\cdot Q^r_n}\right)^2 = \frac{h^2}{4\cdot\pi\cdot c^2\cdot m^2_n\cdot\left(Q^r_n\right)^2} \quad 156$$

(f) The spin area that should be considered $\mathcal{A}_{sx}$ is

protons and electrons

$$\mathcal{A}_{se,sp} = \pi \cdot r_{se,sp}^2 = \pi \cdot \left(\frac{h}{2 \cdot \pi \cdot c \cdot m_{e,p}} \sqrt{1 - \frac{\left(Q_{e,p}^v\right)^2}{\left(l_{e,p}^v\right)^4}} \right)^2 = \frac{h^2 \cdot \left(1 - \frac{\left(Q_{e,p}^v\right)^2}{\left(l_{e,p}^v\right)^4} \right)}{4 \cdot \pi \cdot c^2 \cdot m_{e,p}^2} \quad 157$$

negatrons

$$\mathcal{A}_{sn} = \pi \cdot r_{sn}^2 = \pi \cdot \left(\frac{h}{2 \cdot \pi \cdot c \cdot m_n .(299,792,458.)} \sqrt{1 - \frac{1}{\left(Q_n^r\right)^2}} \right)^2 = $$

$$= \frac{h^2 \cdot \left(1 - \frac{1}{\left(Q_n^r\right)^2} \right)}{4 \cdot \pi \cdot c^2 \cdot m_n^2 \cdot (299,792,458.)^2} \quad 158$$

The orbital magnetic dipole moment of deuterium

Is given the orbital magnetic dipole moment of electron η_{oe} by

$$\eta_{oe} = I_e \cdot \mathcal{A}_e \cdot Z = \frac{-q \cdot c^2 \cdot m_e}{h \cdot \left(l_e^v\right)^2} \cdot \frac{h^2 \cdot \left(Q_e^v\right)^2}{4 \cdot \pi \cdot c^2 \cdot m_e^2} \cdot 1 = \frac{-q \cdot h}{4 \cdot \pi \cdot m_e} \cdot \frac{\left(Q_e^v\right)^2}{\left(l_e^v\right)^2} =$$

$$= \frac{-9.2822248310634898622951496217 5 \times 10^{-24}}{(-9.2723851482070360030634006745 6 \times 10^{-24})} \text{ A.m}^2. \quad 159$$

Is given the orbital magnetic dipole moment of protons η_{op} by

$$\eta_{op} = I_p \cdot \mathcal{A}_p \cdot A = \frac{q \cdot c^2 \cdot m_p}{h \cdot \left(l_p^v\right)^2} \cdot \frac{h^2 \cdot \left(Q_p^v\right)^2}{4 \cdot \pi \cdot c^2 \cdot m_p^2} \cdot 2 = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(\frac{Q_p^v}{l_p^v} \right)^2 =$$

$$= \frac{9.9601612163688922107367919642 3 \times 10^{-27}}{(9.1827304169419671039589561128 8 \times 10^{-27})} \text{ A.m}^2. \quad 160$$

Is given the orbital magnetic dipole moment of negatron η_{on} by

$$\eta_{on} = I_n \cdot \mathcal{A}_n \cdot (A - Z) = \frac{-q \cdot c^2 \cdot m_n \cdot Q_n^r}{h} \cdot \frac{h^2}{4 \cdot \pi \cdot c^2 \cdot m_n^2 \cdot \left(Q_n^r\right)^2} \cdot 1 = \frac{-q \cdot h}{4 \cdot \pi \cdot m_n} \cdot \frac{1}{Q_n^r} =$$

$$= \frac{-5.2063696737587334397790130841 5 \times 10^{-26}}{(-4.4035501009751761395606176828 3 \times 10^{-26})} \text{ A.m}^2. \quad 161$$

Gyromagnetic ratios of Deuterium

The spin magnetic dipole moment of deuterium

Is given the spin magnetic dipole moment of electron η_{se} by

$$\eta_{se} = I_{se} \cdot \mathcal{A}_{se} \cdot Z = \frac{-q \cdot c^2 \cdot m_e}{h} \cdot \frac{h^2 \cdot \left(1 - \frac{\left(Q_e^v\right)^2}{\left(l_e^v\right)^4}\right)}{4 \cdot \pi \cdot c^2 \cdot m_e^2} \cdot 1 = \frac{-q \cdot h}{4 \cdot \pi \cdot m_e} \cdot \left(1 - \frac{\left(Q_e^v\right)^2}{\left(l_e^v\right)^4}\right) =$$

$$= \frac{-9.2833562637408726219077322770 9\times 10^{-24}}{\left(-9.27351538150184365902675638377 \times 10^{-24}\right)} \text{ A.m}^2. \qquad 162$$

Is given the spin magnetic dipole moment of protons η_{sp} by

$$\eta_{sp} = I_{sp} \cdot \mathcal{A}_{sp} \cdot A = \frac{q \cdot c^2 \cdot m_p}{h} \cdot \frac{h^2 \cdot \left(1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right)}{4 \cdot \pi \cdot c^2 \cdot m_p^2} \cdot 2 = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right) =$$

$$= \frac{1.00841742643509084306634872939 \times 10^{-26}}{\left(1.00656967905018950635013612865 \times 10^{-26}\right)} \text{ A.m}^2. \qquad 163$$

Is given the spin magnetic dipole moment of negatron η_{ns} by

$$\eta_{sn} = I_{sn} \cdot \mathcal{A}_{sn} \cdot (A - Z) = \frac{-q \cdot c^2 \cdot m_n \cdot (299{,}792{,}458.)}{h} \cdot \frac{h^2 \cdot \left(1 - \frac{1}{\left(Q_n^r\right)^2}\right)}{4 \cdot \pi \cdot c^2 \cdot m_n^2 \cdot (299{,}792{,}458.)^2} \cdot 1 =$$

$$= \frac{-q \cdot h}{4 \cdot \pi \cdot m_n \cdot (299{,}792{,}458.)} \cdot \left(1 - \frac{1}{\left(Q_n^v\right)^2}\right)$$

$$= \frac{-1.03196092441193763687855357063 \times 10^{-32}}{\left(-1.22206619654025726508765519617 \times 10^{-32}\right)} \text{ A.m}^2. \qquad 164$$

Gyromagnetic ratios of Deuterium

Orbital: Gyromagnetic ratios and Landé factors of deuterium

Is given the gyromagnetic ratio γ_{Oe} and Landé factor g_{Oe} of electronic orbital by

the resultant of the angular momentum is

$$\varphi_{Oe} = \sqrt{(\varphi_{oe})^2 + (\varphi_{se})^2} = \frac{1.491219253513490255386464256 10\times 10^{-34}}{(1.49121925351349068302881787085\times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1}. \quad 165$$

the resultant of the magnetic moment is

$$\eta_{Oe} = -\sqrt{(\eta_{oe})^2 + (\eta_{se})^2} = \frac{-1.31278483131832595341621515842\times 10^{-23}}{(-1.31139320521208174094944297174\times 10^{-23})} \text{ A.m}^2. \quad 166$$

then

$$\gamma_{Oe} = \frac{\eta_{Oe}}{\varphi_{Oe}} = \frac{-8.80343268251967926025390625000\times 10^{10}}{(-8.79410054639706878662109375000\times 10^{10})} \text{ Hz.T}^{-1} \quad 167$$

$$g_{Oe} = \frac{2\cdot m_e}{-q}\cdot\gamma_{Oe} = \frac{1.00000000000000000000000000000}{(0.99999999999999966693309261245 \simeq 1.)} \quad 168$$

Is given the gyromagnetic ratio γ_{Op} and Landé factor g_{Op} of protonic orbital by

the resultant of the angular momentum is

$$\varphi_{Op} = \sqrt{(\varphi_{op})^2 + (\varphi_{sp})^2} = \frac{2.95439798093349729622918740679\times 10^{-34}}{(2.84481522314773746018742695154\times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1}. \quad 169$$

the resultant of the magnetic moment is

$$\eta_{Op} = \sqrt{(\eta_{op})^2 + (\eta_{sp})^2} = \frac{1.41737568079128633894730894033\times 10^{-26}}{(1.36250060472849467192834612443\times 10^{-26})} \text{ A.m}^2. \quad 170$$

then

$$\gamma_{Op} = \frac{\eta_{Op}}{\varphi_{Op}} = \frac{4.79751099864832758903503417969\times 10^{7}}{(4.78941687896661311388015747070\times 10^{7})} \text{ Hz.T}^{-1} \quad 171$$

$$g_{Op} = \gamma_{Op}\cdot\frac{2\cdot m_p}{q}\cdot 2 = \frac{2.00000000000000044408920985006 \simeq 2.}{(2.00000000000000000000000000000)} \quad 172$$

Is given the gyromagnetic ratio γ_{On} and Landé factor g_{On} of negatronic orbital by

the resultant of the angular momentum is

$$\varphi_{On} = \sqrt{(\varphi_{on})^2 + (\varphi_{sn})^2} = \frac{1.77420667420905164420730681623\times 10^{-36}}{(1.26736259284788059830364927753\times 10^{-36})} \text{ kg.m}^2.\text{s}^{-1}. \quad 173$$

the resultant of the magnetic moment is

$$\eta_{On} = -\sqrt{(\eta_{on})^2 + (\eta_{sn})^2} = \frac{-5.20636967375883560676848884938\times 10^{-26}}{(-4.40355010097534546125665897912\times 10^{-26})} \text{ A.m}^2. \quad 174$$

then

$$\gamma_{On} = \frac{\eta_{On}}{\varphi_{On}} = \frac{-2.93447756083989219665527343750\times 10^{10}}{(-3.47457793517493896484375000000\times 10^{10})} \text{ Hz.T}^{-1} \quad 175$$

$$g_{On} = \frac{2\cdot m_n}{-q}\cdot\gamma_{On} = \frac{0.99999999999999966693309261245 \simeq 1.}{(1.00000000000000000000000000000)} \quad 176$$

Gyromagnetic ratios of Deuterium

Nucleus: Gyromagnetic ratios and Landé factors of deuterium

Is given the gyromagnetic ratio γ_{ND} and Landé factor $\boldsymbol{g}_{ND}$ of the nucleus of deuterium by

the resultant of the angular momentum is

$$\varphi_{ND} = \sqrt{\left(\varphi_{op} - \varphi_{on}\right)^2 + \left(\varphi_{sp} - \varphi_{sn}\right)^2} = \begin{matrix} 2.94195738015787514487395111761 \times 10^{-34} \\ \left(2.83628913761117755935503527436 \times 10^{-34}\right) \end{matrix} \ \text{kg.m}^2\text{.s}^{-1}. \qquad 177$$

the resultant of the magnetic moment is

$$\eta_{ND} = \sqrt{\left(\eta_{op} + \eta_{on}\right)^2 + \left(\eta_{sp} + \eta_{sn}\right)^2} = \begin{matrix} 4.32943190944369851183418742314 \times 10^{-26} \\ \left(3.62771777272507939978085657604 \times 10^{-26}\right) \end{matrix} \ \text{A.m}^2. \qquad 178$$

then

$$\gamma_{ND} = \frac{\eta_{ND}}{\varphi_{ND}} = \begin{matrix} 1.47161612151273488998413085938 \times 10^{8} \\ \left(1.27903665554368376731872558594 \times 10^{8}\right) \end{matrix} \ \text{Hz.T}^{-1} \qquad 179$$

$$\boldsymbol{g}_{ND} = \frac{2\left(2 \cdot \boldsymbol{m}_p + \boldsymbol{m}_n\right)}{\boldsymbol{q}} \cdot \gamma_{ND} = \begin{matrix} 6.13992996737405594132042097044 \\ \left(5.34477666382772120812205685070\right) \end{matrix} \qquad 180$$

Atom: Gyromagnetic ratios and Landé factors of deuterium

Is given the gyromagnetic ratio γ_D and Landé factor $\boldsymbol{g}_D$ of deuterium atom by

the resultant of the angular momentum is

$$\varphi_D = \sqrt{\left(\varphi_{op} - \varphi_{on} - \varphi_{oe}\right)^2 + \left(\varphi_{sp} - \varphi_{sn} - \varphi_{se}\right)^2} =$$

$$= \begin{matrix} 1.45090217830372911526968955287 \times 10^{-34} \\ \left(1.34885110221169520253906721600 \times 10^{-34}\right) \end{matrix} \ \text{kg.m}^2\text{.s}^{-1}. \qquad 181$$

the resultant of the magnetic moment is

$$\eta_D = \sqrt{\left(\eta_{op} + \eta_{on} + \eta_{oe}\right)^2 + \left(\eta_{sp} + \eta_{sn} + \eta_{se}\right)^2} =$$

$$= \begin{matrix} 1.31505389594781848229623375760 \times 10^{-23} \\ \left(1.31314956484299735195767099570 \times 10^{-23}\right) \end{matrix} \ \text{A.m}^2. \qquad 182$$

then

$$\gamma_D = \frac{\eta_D}{\varphi_D} = \begin{matrix} 9.06369785373998870849609375000 \times 10^{10} \\ \left(9.73531891466627807617187500000 \times 10^{10}\right) \end{matrix} \ \text{Hz.T}^{-1} \qquad 183$$

$$\boldsymbol{g}_D = \frac{2\left(2 \cdot \boldsymbol{m}_p + \boldsymbol{m}_n + \boldsymbol{m}_e\right)}{\boldsymbol{q}} \cdot \gamma_D = \begin{matrix} 3782.61833940777432871982455254 \\ \left(4069.25512441399587260093539953\right) \end{matrix} \qquad 184$$

Gyromagnetic ratios of Deuterium

Summary of deuterium

It is regrettable on this Physics field contains very few variables to compare with the obtained data of experimental physics, whereby it does not carry out any comparison or whatever comment.

First part - Calculations performed according to constants of NIST

Table 1: The orbital gyromagnetic ratios and Landé factor of deuterium.

Particle in orbit	Gyromagnetic ratio $Hz.T^{-1}$	Measure unit	Landé factor
Electron	$-8.794100546397068786621093750000\times10^{10}$	$Hz.T^{-1}$	0.9999≈1.
Protons	$4.789416878966613113880157470\times10^{7}$	$Hz.T^{-1}$	2.
Negatron	$-3.474577935174938964843750000000\times10^{10}$	$Hz.T^{-1}$	1.

Table 2: The nuclear gyromagnetic ratios and Landé factor of deuterium.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$1.27903665554368376731872558594\times10^{8}$	$Hz.T^{-1}$
Landé factor	5.34477666382772120812205685070	Dimensionless

Table 3: The atomic gyromagnetic ratios and Landé factor of deuterium.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$9.735318914666278076171875000000\times10^{10}$	$Hz.T^{-1}$
Landé factor	4069.25512441399587260093539953	Dimensionless

Second part - Calculations carried out according to corrected constants.

Table 4: The orbital gyromagnetic ratios and Landé factor of deuterium.

Particle in orbit	Gyromagnetic ratio $Hz.T^{-1}$	Measure unit	Landé factor
Electron	$-8.803432682519679260253906250000\times10^{10}$	$Hz.T^{-1}$	1.
Protons	$4.79751099864832758903503417969\times10^{7}$	$Hz.T^{-1}$	2.
Negatron	$-2.93447756083989219665527343750\times10^{10}$	$Hz.T^{-1}$	0.9999≈1.

Table 5: The nuclear gyromagnetic ratios and Landé factor of deuterium.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$1.47161612151273488998413085938\times10^{8}$	$Hz.T^{-1}$
Landé factor	6.13992996737405594132042097044	Dimensionless

Table 6: The atomic gyromagnetic ratios and Landé factor of deuterium.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$9.063697853739988708496093750000\times10^{10}$	$Hz.T^{-1}$
Landé factor	3782.61833940777432871982455254	Dimensionless

Gyromagnetic ratios of Deuterium

Important note:

According to **CODATA 1986**

The shielded proton magnetic moment is $\mu_p^{'} = 1.41057138 \times 10^{-26}$ J.T^{-1}, while the value calculated in theoretical form (expression **170**) is:

$$\mu_p^{'} \neq \eta_{Op} = -1.4173756807912863389473089403 3 \times 10^{-26} \text{ A.m}^2. \quad [\text{QEDa Constants}]$$

and $$\mu_p^{'} \neq \eta_{Op} = \left(-1.3625006047284946719283461244 3 \times 10^{-26}\right) \text{ A.m}^2. \quad [\text{NIST Constants}]$$

The existing differences in this magnitude are insignificant.

The gyromagnetic ratio of the nucleus and the atom does not coincide (see expressions **179** and **183**) because in the calculation of **CODATA** has taken only one proton; in fact, exists in deuterium nucleus two protons and one negatron just as we have already seen.

In the determination of magnetic fields's magnitude and intensity in the Magnetic Resonance System especially, it is suitable to use a hydrogen 1 test-tube in the setup (*to avoid interactions among different atoms*) and use the gyromagnetic ratios values calculated for proton and electron (see *Gyromagnetic ratios of Hydrogen 1 and elementary particles*, expressions **116**, **120** and **124**).

This is because the calculated values are so much for NIST as well as QEDa, these can only suffer minimal corrections in the future.

GYROMAGNETIC RATIOS OF TRITIUM

Landscape of the Patagonia - Argentina Credit: **Alfredo & Sonia** Buenos Aires, Argentina (STOCKXPERT 173661)

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Gyromagnetic ratios of Tritium

Initial note on gyromagnetic ratios of tritium

This publication correct and update the magnitudes given to tritium on the initial version of "*QEDa Theory – The atom and their nucleus.*"

Three protons and two internal negatrons form the nucleus and one more peripheral electron integrates the tritium atom. The protons are in two transverse orbit planes; where one electron, two protons and two negatrons belong to an single orbital plane. For more information, see "*QEDa Theory – The atom and their nucleus*" and "*Atomic and nuclear stability of the Hydrogen family*" on page 16.

Were calculated the magnitudes with corrected constants (see *"Dimensional and constant units "* on page 9). The magnitudes between parentheses correspond with the constants known at the present (NIST – *National Institute of Standards and Technology*). In all the following calculations, have been calculated the magnitudes with high precision.

Quantum states and orbit radius of tritium

To be able to work with the angular and magnetic moments, we need to know before the orbit radius magnitudes and the medium tangential speeds of all tritium particles. Then, there is a concise of these summarized magnitudes.

Is established the quantum state of the electron by following relationship

$$\boldsymbol{Q}_e^v = \frac{2\pi \cdot \boldsymbol{c} \cdot \boldsymbol{m}_e \cdot \boldsymbol{r}_e}{\boldsymbol{h}} = \frac{136.98800231166896423928847070 8}{(136.988002311668964239288470708)} \quad \therefore \quad \boldsymbol{l}_e^v = \frac{137.}{(137.)} \qquad 185$$

where $\boldsymbol{Q}_e^v$ is the quantum vectorial number calculated for electron, $\boldsymbol{c}$ is the speed of the light, $\boldsymbol{m}_e$ is the inertial mass of electron, $\boldsymbol{r}_e$ is the orbit radius of electron, $\boldsymbol{h}$ is the constant of Planck and $\boldsymbol{l}_e^v$ is the quantum state of the electron (the bigger integer most closely whereby the value has been calculated).

Is established the quantum state of the protons by following relationship

$$\boldsymbol{Q}_p^v = \frac{2\pi \cdot \boldsymbol{c} \cdot \boldsymbol{m}_p \cdot \boldsymbol{r}_p}{\boldsymbol{h}} = \frac{27.2912586591966537241660262225}{(25.1637564062980452206375048263)} \quad \therefore \quad \boldsymbol{l}_p^v = \frac{28.}{(26.)} \qquad 186$$

where $\boldsymbol{Q}_p^v$ is the quantum vectorial number calculated for protons, $\boldsymbol{m}_p$ is the inertial mass of proton, $\boldsymbol{r}_p$ is the orbit radius of protons (according to expression number **5**) and $\boldsymbol{l}_p^v$ is the quantum state of the protons (the bigger integer most closely whereby the value has been calculated).

Is established the quantum state of negatron by following relationship

$$\boldsymbol{Q}_n^r = \frac{\boldsymbol{h}}{2 \cdot \pi \cdot \boldsymbol{c} \cdot \boldsymbol{m}_n \cdot \boldsymbol{r}_n} = \frac{38.3397409724710556133686623070}{(52.4054110977518732283897406887)} \quad \therefore \quad \boldsymbol{l}_n^r = \frac{38.}{(52.)} \qquad 187$$

where $\boldsymbol{Q}_n^r$ is the quantum radial number calculated for negatron, $\boldsymbol{m}_n$ is the inertial mass of negatron, $\boldsymbol{r}_n$ is the orbit radius of negatrons (according to expression number **6**) and $\boldsymbol{l}_n^r$ is the quantum state of the negatrons (the smallest integer most closely whereby the value has been calculated).

Gyromagnetic ratios of Tritium

Is given the radius of orbits to

electron $$r_e = \frac{h \cdot Q_e^v}{2 \cdot \pi \cdot c \cdot m_e} = \frac{5.295532193640111164416278116 87 \times 10^{-11}}{(5.2899186302660405082032237939 5 \times 10^{-11})} \text{ meter}$$ 188

protons $$r_p = \frac{h \cdot Q_p^v}{2 \cdot \pi \cdot c \cdot m_p} = \frac{5.749294788800877716469429146 29 \times 10^{-15}}{(5.292162186986683026566886931 88 \times 10^{-15})} \text{ meter}$$ 189

negatron $$r_n = \frac{h}{2 \cdot \pi \cdot c \cdot m_n \cdot Q_n^r} = \frac{3.360908206045256548271791396 71 \times 10^{-15}}{(2.911393833232008867719356748 17 \times 10^{-15})} \text{ meter}$$ 190

Is given the radius of spin r_{sx} (sub-index x identifies to the particle) to

electron $$r_{se} = \frac{h}{2 \cdot \pi \cdot c \cdot m_e}\sqrt{1 - \frac{(Q_e^v)^2}{(I_e^v)^4}} = \frac{3.865587537499498039825307386 78 \times 10^{-13}}{(3.861489796266646546700200246 85 \times 10^{-13})} \text{ meter}$$ 191

protons $$r_{sp} = \frac{h}{2 \cdot \pi \cdot c \cdot m_p}\sqrt{1 - \frac{(Q_p^v)^2}{(I_p^v)^4}} = \frac{2.105366569869205292316024860 51 \times 10^{-16}}{(2.101631510996323107943700855 61 \times 10^{-16})} \text{ meter}$$ 192

negatron $$r_{sn} = \frac{h}{2 \cdot \pi \cdot c \cdot m_n .(299,792,458.)}\sqrt{1 - \frac{1}{(Q_n^r)^2}} =$$

$$= \frac{4.296722901161109869198435848 77 \times 10^{-22}}{(5.088353842505980550060546598 16 \times 10^{-22})} \text{ meter}$$ 193

Is given the orbit medium tangential speed to

electron $$v_e = c \cdot \frac{Q_e^v}{(I_e^v)^2} = \frac{2.188074480767484754323959350 59 \times 10^{6}}{(2.188074480767484754323959350 59 \times 10^{6})} \text{ m.s}^{-1}.$$ 194

protons $$v_p = c \cdot \frac{Q_p^v}{(I_p^v)^2} = \frac{1.043585907570707798004150390 63 \times 10^{7}}{(1.115962187212623842060565948 49 \times 10^{7})} \text{ m.s}^{-1}.$$ 195

negatron $$v_n = c = 299,792,458. \text{ m.s}^{-1}.$$ 196

Is given the spin medium tangential speed v_{sx} (sub-index x identifies to the particle) to

electron $$v_{se} = c \cdot \sqrt{1 - \frac{(Q_e^v)^2}{(I_e^v)^4}} = \frac{2.997844729197100996971130371 09 \times 10^{8}}{(2.997844729197100996971130371 09 \times 10^{8})} \text{ m.s}^{-1}.$$ 197

protons $$v_{sp} = c \cdot \sqrt{1 - \frac{(Q_p^v)^2}{(I_p^v)^4}} = \frac{2.996107653590466976165771484 38 \times 10^{8}}{(2.995846803715986609458923339 84 \times 10^{8})} \text{ m.s}^{-1}.$$ 198

negatron $$v_{sn} = c \cdot \sqrt{1 - \frac{1}{(Q_n^r)^2}} = \frac{2.996904659689970016479492187 50 \times 10^{8}}{(2.997378724133208394050598144 53 \times 10^{8})} \text{ m.s}^{-1}.$$ 199

Gyromagnetic ratios of Tritium

The orbital angular momentum of tritium

With the purpose of facilitating the calculations, we will carry out them in function of atomic particle quantum state.

Is given the orbital angular momentum of the electron φ_{oe} by

$$\varphi_{oe} = m_e \cdot v_e \cdot r_e = m_e \cdot \frac{c \cdot Q_e^v}{(l_e^v)^2} \cdot \frac{h^2}{4 \cdot \pi^2 \cdot q^2 \cdot k_e \cdot m_e} = \frac{c \cdot h^2 \cdot Q_e^v}{4 \cdot \pi^2 \cdot q^2 \cdot k_e \cdot (l_e^v)^2} =$$

$$= \frac{1.05438698355637042486953873495 \times 10^{-34}}{(1.05438698355637063869071554232 \times 10^{-34})} \text{ kg.m}^2\text{.s}^{-1}. \quad 200$$

Is given the orbital angular momentum of the solitary proton φ_{op1} by

$$\varphi_{op1} = m_p \cdot v_p \cdot r_p = m_p \cdot \frac{c \cdot Q_p^v}{(l_p^v)^2} \cdot \frac{h}{2 \cdot \pi \cdot c \cdot m_p} \cdot \sqrt{\frac{2 \cdot m_p}{m_n}} = \frac{h \cdot Q_p^v}{2 \cdot \pi \cdot (l_p^v)^2} \cdot \sqrt{\frac{2 \cdot m_p}{m_n}} =$$

$$= \frac{1.00186031467126591267910851347 \times 10^{-34}}{(9.87825775866525299067419157538 \times 10^{-35})} \text{ kg.m}^2\text{.s}^{-1}. \quad 201$$

Is given the orbital angular momentum of the complete protonic orbital φ_{op2} by

$$\varphi_{op2} = m_p \cdot v_p \cdot r_p \cdot 2 = m_p \cdot \frac{c \cdot Q_p^v}{(l_p^v)^2} \cdot \frac{h}{2 \cdot \pi \cdot c \cdot m_p} \cdot \sqrt{\frac{2 \cdot m_p}{m_n}} \cdot 2 = \frac{h \cdot Q_p^v}{\pi \cdot (l_p^v)^2} \cdot \sqrt{\frac{2 \cdot m_p}{m_n}} =$$

$$= \frac{2.00372062934253182535821702695 \times 10^{-34}}{(1.97565155173305059813483831508 \times 10^{-34})} \text{ kg.m}^2\text{.s}^{-1}. \quad 202$$

Is given the orbital angular momentum of the complete negatronic orbital φ_{on} by

$$\varphi_{on} = m_n \cdot v_n \cdot r_n \cdot 2 = m_n \cdot \frac{c}{Q_n^r} \cdot \frac{h}{2 \cdot \pi \cdot c \cdot m_n \cdot Q_n^r} \cdot 2 = \frac{h}{\pi \cdot (Q_n^r)^2} =$$

$$= \frac{5.50119356894802871724854141596 \times 10^{-36}}{(4.02466714896048147266664495637 \times 10^{-36})} \text{ kg.m}^2\text{.s}^{-1}. \quad 203$$

The spin angular momentum of tritium

Is given the spin angular momentum of electron φ_{se} by

$$\varphi_{se} = m_e \cdot v_{se} \cdot r_{se} = m_e \cdot c \cdot \sqrt{1 - \frac{(Q_e^v)^2}{(l_e^v)^4}} \cdot \frac{h}{2 \cdot \pi \cdot c \cdot m_e} \cdot \sqrt{1 - \frac{(Q_e^v)^2}{(l_e^v)^4}} = \frac{h}{2 \cdot \pi} \cdot \left(1 - \frac{(Q_e^v)^2}{(l_e^v)^4}\right) =$$

$$= \frac{1.05451550531807233925063097997 \times 10^{-34}}{(1.05451550531807255307180778735 \times 10^{-34})} \text{ kg.m}^2\text{.s}^{-1}. \quad 204$$

Is given the spin angular momentum of the solitary proton φ_{sp1} by

$$\varphi_{sp1} = m_p \cdot v_{sp} \cdot r_{sp} = m_p \cdot c \cdot \sqrt{1 - \frac{(Q_p^v)^2}{(l_p^v)^4}} \cdot \frac{h}{2 \cdot \pi \cdot c \cdot m_p} \cdot \sqrt{1 - \frac{(Q_p^v)^2}{(l_p^v)^4}} = \frac{h}{2 \cdot \pi} \left(1 - \frac{(Q_p^v)^2}{(l_p^v)^4}\right) =$$

$$= \frac{1.05329379931002739484613083404 \times 10^{-34}}{(1.05311040163092450399333525112 \times 10^{-34})} \text{ kg.m}^2\text{.s}^{-1}. \quad 205$$

Is given the spin angular momentum of the complete protonic orbit φ_{sp2} by

$$\varphi_{sp2} = m_p \cdot v_{sp} \cdot r_{sp} \cdot 2 = m_p \cdot c \cdot \sqrt{1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}} \cdot \frac{h}{2 \cdot \pi \cdot c \cdot m_p} \cdot \sqrt{1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}} \cdot 2 = \frac{h}{\pi}\left(1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right) =$$

$$= \frac{2.10658759862005478969226166809 \times 10^{-34}}{\left(2.10622080326184900798667050224 \times 10^{-34}\right)} \text{ kg.m}^2\text{.s}^{-1}. \qquad 206$$

Is given the spin angular momentum of the complete negatronic orbit φ_{sn} by

$$\varphi_{sn} = m_n \cdot v_{sn} \cdot r_{sn} \cdot 2 = m_n \cdot c \cdot \sqrt{1 - \frac{1}{\left(Q_n^r\right)^2}} \cdot \frac{h}{2 \cdot \pi \cdot c \cdot m_n \cdot (299,792,458.)} \cdot \sqrt{1 - \frac{1}{\left(Q_n^r\right)^2}} \cdot 2 =$$

$$= \frac{h}{\pi \cdot (299,792,458.)}\left(1 - \frac{1}{\left(Q_n^r\right)^2}\right) =$$

$$= \frac{7.03055882279265593967788181899 \times 10^{-43}}{\left(7.03278325229066372621292217986 \times 10^{-43}\right)} \text{ kg.m}^2\text{.s}^{-1}. \qquad 207$$

The magnetic dipole moment

For the calculation of the magnetic dipole moments, it will be used the following properties

(a) The nodal frequency of passage of particles f_x is

protons and electrons

$$f_{e,p} = \frac{v_{e,p}}{2 \cdot \pi \cdot r_{e,p}} = \frac{c \cdot \frac{Q_{e,p}^v}{\left(l_{e,p}^v\right)^2}}{2 \cdot \pi \cdot \frac{h \cdot Q_{e,p}^v}{2 \cdot \pi \cdot c \cdot m_{e,p}}} = \frac{c^2 \cdot m_{e,p}}{h \cdot \left(l_{e,p}^v\right)^2} \qquad 208$$

negatrons

$$f_n = \frac{v_n}{2 \cdot \pi \cdot r_n} = \frac{c}{2 \cdot \pi \cdot \frac{h}{2 \cdot \pi \cdot c \cdot m_n \cdot Q_n^r}} = \frac{c^2 \cdot m_n \cdot Q_n^r}{h} \qquad 209$$

(b) The spin frequency of passage of particles f_{sx} is

protons and electrons

$$f_{se,sp} = \frac{v_{se,sp}}{2 \cdot \pi \cdot r_{se,sp}} = \frac{c \cdot \sqrt{1 - \frac{\left(Q_{e,p}^v\right)^2}{\left(l_{e,p}^v\right)^4}}}{\frac{h}{c \cdot m_{e,p}} \sqrt{1 - \frac{\left(Q_{e,p}^v\right)^2}{\left(l_{e,p}^v\right)^4}}} = \frac{c^2 \cdot m_{e,p}}{h} \qquad 210$$

negatrons

$$f_{sn} = \frac{v_{sn}}{2 \cdot \pi \cdot r_{sn}} = \frac{c \cdot \sqrt{1 - \frac{1}{\left(Q_n^r\right)^2}}}{\frac{h}{c \cdot m_p \cdot (299,792,458.)} \sqrt{1 - \frac{1}{\left(Q_n^r\right)^2}}} = \frac{c^2 \cdot m_n \cdot (299,792,458.)}{h} \qquad 211$$

(c) The nodal electric intensity I_x is

protons and electrons $$I_{e,p} = f_{e,p}\cdot(\pm q) = \frac{c^2\cdot m_{e,p}}{h\cdot\left(l_{e,p}^v\right)^2}\cdot(\pm q) = \frac{\pm q\cdot c^2\cdot m_{e,p}}{h\cdot\left(l_{e,p}^v\right)^2} \qquad 212$$

negatrons $$I_n = f_n\cdot(-q) = \frac{c^2\cdot m_n}{h}\cdot(-q) = \frac{-q\cdot c^2\cdot m_n}{h} \qquad 213$$

(d) The spin electric intensity I_{sx} is

protons and electrons $$I_{se,sp} = f_{se,sp}\cdot(\pm q) = \frac{c^2\cdot m_{e,p}}{h}\cdot(\pm q) = \frac{\pm q\cdot c^2\cdot m_{e,p}}{h} \qquad 214$$

negatrons

$$I_{sn} = f_{sn}\cdot(-q) = \frac{c^2\cdot m_n\cdot(299,792,458.)}{h}\cdot(-q) = \frac{-q\cdot c^2\cdot m_n\cdot(299,792,458.)}{h} \qquad 215$$

(e) The orbital area that should be considered $\mathcal{A}_x$ is

protons and electrons $$\mathcal{A}_{e,p} = \pi\cdot r_{e,p}^2 = \pi\cdot\left(\frac{h\cdot Q_{e,p}^v}{2\cdot\pi\cdot c\cdot m_{e,p}}\right)^2 = \frac{h^2\cdot\left(Q_{e,p}^v\right)^2}{4\cdot\pi\cdot c^2\cdot m_{e,p}^2} \qquad 216$$

negatrons $$\mathcal{A}_n = \pi\cdot r_n^2 = \pi\cdot\left(\frac{h}{2\cdot\pi\cdot c\cdot m_n\cdot Q_n^r}\right)^2 = \frac{h^2}{4\cdot\pi\cdot c^2\cdot m_n^2\cdot\left(Q_n^r\right)^2} \qquad 217$$

(f) The spin area that should be considered $\mathcal{A}_x$ is

protons and electrons

$$\mathcal{A}_{se,sp} = \pi\cdot r_{se,sp}^2 = \pi\cdot\left(\frac{h}{2\cdot\pi\cdot c\cdot m_{e,p}}\sqrt{1-\frac{\left(Q_{e,p}^v\right)^2}{\left(l_{e,p}^v\right)^4}}\right)^2 = \frac{h^2\cdot\left(1-\frac{\left(Q_{e,p}^v\right)^2}{\left(l_{e,p}^v\right)^4}\right)}{4\cdot\pi\cdot c^2\cdot m_{e,p}^2} \qquad 218$$

negatrons $$\mathcal{A}_{sn} = \pi\cdot r_{sn}^2 = \pi\cdot\left(\frac{h}{2\cdot\pi\cdot c\cdot m_n.(299,792,458.)}\sqrt{1-\frac{1}{\left(Q_n^r\right)^2}}\right)^2 =$$

$$= \frac{h^2\cdot\left(1-\frac{1}{\left(Q_n^r\right)^2}\right)}{4\cdot\pi\cdot c^2\cdot m_n^2\cdot(299,792,458.)^2} \qquad 219$$

The orbital magnetic dipole moment of tritium

Is given the orbital magnetic dipole moment of electron η_{oe} by

$$\eta_{oe} = I_e\cdot\mathcal{A}_e\cdot Z = \frac{-q\cdot c^2\cdot m_e}{h\cdot\left(l_e^v\right)^2}\cdot\frac{h^2\cdot\left(Q_e^v\right)^2}{4\cdot\pi\cdot c^2\cdot m_e^2}\cdot 1 = \frac{-q\cdot h}{4\cdot\pi\cdot m_e}\cdot\frac{\left(Q_e^v\right)^2}{\left(l_e^v\right)^2} =$$

$$= \frac{-9.28222483106348986229514962175\times 10^{-24}}{\left(-9.27238514820703600306340067456\times 10^{-24}\right)}\ \text{A.m}^2. \qquad 220$$

Gyromagnetic ratios of Tritium

Is given the orbital magnetic dipole moment of the solitary protons η_{op1} by

$$\eta_{op1} = I_p \cdot \mathcal{A}_p = \frac{q \cdot c^2 \cdot m_p}{h \cdot \left(l_p^v\right)^2} \cdot \frac{h^2 \cdot \left(Q_p^v\right)^2}{4 \cdot \pi \cdot c^2 \cdot m_p^2} = \frac{q \cdot h}{4 \cdot \pi \cdot m_p} \cdot \left(\frac{Q_p^v}{l_p^v}\right)^2 =$$

$$= \frac{4.806435878744672696046043183 46 \times 10^{-27}}{\left(4.7311094444134255537112227 3341 \times 10^{-27}\right)} \text{ A.m}^2. \qquad 221$$

Is given the orbital magnetic dipole moment of the complete protonic orbit η_{op2} by

$$\eta_{op2} = I_p \cdot \mathcal{A}_p \cdot 2 = \frac{q \cdot c^2 \cdot m_p}{h \cdot \left(l_p^v\right)^2} \cdot \frac{h^2 \cdot \left(Q_p^v\right)^2}{4 \cdot \pi \cdot c^2 \cdot m_p^2} \cdot 2 = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(\frac{Q_p^v}{l_p^v}\right)^2 =$$

$$= \frac{9.612871757489345392092086366 92 \times 10^{-27}}{\left(9.46221888882685110742244546682 \times 10^{-27}\right)} \text{ A.m}^2. \qquad 222$$

Is given the orbital magnetic dipole moment of the complete negatronic orbit η_{on} by

$$\eta_{on} = I_n \cdot \mathcal{A}_n \cdot 2 = \frac{-q \cdot c^2 \cdot m_n}{h} \cdot \frac{h^2}{4 \cdot \pi \cdot c^2 \cdot m_n^2 \cdot \left(Q_n^r\right)^2} \cdot 2 = \frac{-q \cdot h}{2 \cdot \pi \cdot m_n} \cdot \frac{1}{\left(Q_n^r\right)^2} =$$

$$= \frac{-1.614312908591471640607080421 27 \times 10^{-25}}{\left(-1.39840196722015153329782978441 \times 10^{-25}\right)} \text{ A.m}^2. \qquad 223$$

The spin magnetic dipole moment of tritium

Is given the spin magnetic dipole moment of electron η_{se} by

$$\eta_{se} = I_{se} \cdot \mathcal{A}_{se} \cdot Z = \frac{-q \cdot c^2 \cdot m_e}{h} \cdot \frac{h^2 \cdot \left(1 - \frac{\left(Q_e^v\right)^2}{\left(l_e^v\right)^4}\right)}{4 \cdot \pi \cdot c^2 \cdot m_e^2} = \frac{-q \cdot h}{4 \cdot \pi \cdot m_e} \cdot \left(1 - \frac{\left(Q_e^v\right)^2}{\left(l_e^v\right)^4}\right) =$$

$$= \frac{-9.283356263740872621907732277 09 \times 10^{-24}}{\left(-9.27351538150184365902675638377 \times 10^{-24}\right)} \text{ A.m}^2. \qquad 224$$

Is given the spin magnetic dipole moment of the solitary protons η_{sp1} by

$$\eta_{sp1} = I_{sp} \cdot \mathcal{A}_{sp} = \frac{q \cdot c^2 \cdot m_p}{h} \cdot \frac{h^2 \cdot \left(1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right)}{4 \cdot \pi \cdot c^2 \cdot m_p^2} = \frac{q \cdot h}{4 \cdot \pi \cdot m_p} \cdot \left(1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right) =$$

$$= \frac{5.053188586997939708812537593 03 \times 10^{-27}}{\left(5.04378473298645915050972150434 \times 10^{-27}\right)} \text{ A.m}^2. \qquad 225$$

Gyromagnetic ratios of Tritium

Is given the spin magnetic dipole moment of complete protonic orbit η_{sp2} by

$$\eta_{sp2} = I_{sp} \cdot \mathcal{A}_{sp} \cdot 2 = \frac{q \cdot c^2 \cdot m_p}{h} \cdot \frac{h^2 \cdot \left(1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right)}{4 \cdot \pi \cdot c^2 \cdot m_p^2} \cdot 2 = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right) =$$
$$= \frac{1.01063771739958794176250751860 \times 10^{-26}}{\left(1.00875694659729183010194430087 \times 10^{-26}\right)} \text{ A.m}^2. \qquad \mathbf{226}$$

Is given the spin magnetic dipole moment of complete negatronic orbit η_{sn} by

$$\eta_{sn} = I_{sn} \cdot \mathcal{A}_{sn} \cdot 2 = \frac{-q \cdot c^2 \cdot m_n \cdot (299,792,458.)}{h} \cdot \frac{h^2 \cdot \left(1 - \frac{1}{\left(Q_n^v\right)^2}\right)}{4 \cdot \pi \cdot c^2 \cdot m_n^2 \cdot (299,792,458.)^2} \cdot 2 =$$
$$= \frac{-q \cdot h}{2 \cdot \pi \cdot m_n \cdot (299,792,458.)} \cdot \left(1 - \frac{1}{\left(Q_n^v\right)^2}\right) =$$
$$= \frac{2.06310171056499830894341181235 \times 10^{-32}}{\left(2.44359535112769823562153612072 \times 10^{-32}\right)} \text{ A.m}^2. \qquad \mathbf{227}$$

Orbital: Gyromagnetic ratios and Landé factors of tritium

Is given the gyromagnetic ratio γ_{Oe} and Landé factor g_{Oe} of the electronic orbital by

the resultant of the angular momentum is

$$\varphi_{Oe} = \sqrt{\left(\varphi_{oe}\right)^2 + \left(\varphi_{se}\right)^2} = \frac{1.49121925351349025538646425610 \times 10^{-34}}{\left(1.49121925351349068302881787085 \times 10^{-34}\right)} \text{ kg.m}^2\text{.s}^{-1}. \qquad \mathbf{228}$$

the resultant of the magnetic moment is

$$\eta_{Oe} = -\sqrt{\left(\eta_{oe}\right)^2 + \left(\eta_{se}\right)^2} = \frac{-1.31278483131832595341621515842 \times 10^{-23}}{\left(-1.31139320521208174094944297174 \times 10^{-23}\right)} \text{ A.m}^2. \qquad \mathbf{229}$$

then

$$\gamma_{Oe} = \frac{\eta_{Oe}}{\varphi_{Oe}} = \frac{-8.80343268251967926025390625000 \times 10^{10}}{\left(-8.79410054639706878662109375000 \times 10^{10}\right)} \text{ Hz.T}^{-1} \qquad \mathbf{230}$$

$$g_{Oe} = \frac{2 \cdot m_e}{-q} \cdot \gamma_{Oe} = \frac{1.00000000000000000000000000000}{\left(0.999999999999999966693309261245 \simeq 1.\right)} \qquad \mathbf{231}$$

Is given the gyromagnetic ratio γ_{Op} and Landé factor g_{Op} of the protonic orbital by

the resultant of the angular momentum is

$$\varphi_{Op} = \sqrt{\left(\sqrt{\left(\varphi_{op1}\right)^2 + \left(\varphi_{op2}\right)^2}\right)^2 + \left(\sqrt{\left(\varphi_{sp1}\right)^2 + \left(\varphi_{sp2}\right)^2}\right)^2} =$$
$$= \frac{3.25050143653110878385323797233 \times 10^{-34} \text{ kg.m}^2\text{.s}^{-1}.}{\left(3.22865396217181305630481315714 \times 10^{-34} \text{ kg.m}^2\text{.s}^{-1}.\right)} \qquad \mathbf{232}$$

Gyromagnetic ratios of Tritium

the resultant of the magnetic moment is

$$\eta_{Op} = \sqrt{\left(\sqrt{(\eta_{op1})^2 + (\eta_{op2})^2}\right)^2 + \left(\sqrt{(\eta_{sp1})^2 + (\eta_{sp2})^2}\right)^2} = $$

$$= \frac{1.559431639288018230131916542 38\times10^{-26}}{(1.5463369782768113673289954160 2\times10^{-26})} \text{ A.m}^2. \quad 233$$

then

$$\gamma_{Op} = \frac{\eta_{Op}}{\varphi_{Op}} = \frac{4.7975109986483283340930938720 7\times10^{7}}{(4.7894168789666131138801574707 0\times10^{7})} \text{ Hz.T}^{-1} \quad 234$$

$$g_{Op} = \gamma_{Op}\cdot\frac{3\cdot m_p}{q}\cdot 2 = \frac{3.0000000000000001332267629550 19}{(3.0000000000000000444089209850 06)} \simeq 3. \quad 235$$

Is given the gyromagnetic ratio γ_{On} and Landé factor g_{On} of the negatronic orbital by

the resultant of the angular momentum is

$$\varphi_{On} = \sqrt{(\varphi_{on})^2 + (\varphi_{sn})^2} = \frac{5.5011935689480734860574354602 3\times10^{-36}}{(4.0246671489605429462549770768 7\times10^{-36})} \text{ kg.m}^2\text{.s}^{-1}. \quad 236$$

the resultant of the magnetic moment is

$$\eta_{On} = -\sqrt{(\eta_{on})^2 + (\eta_{sn})^2} = \frac{-1.6143129085914849567540233299 9\times10^{-25}}{(-1.3984019672201728850506865173 7\times10^{-25})} \text{ A.m}^2. \quad 237$$

then

$$\gamma_{On} = \frac{\eta_{On}}{\varphi_{On}} = \frac{-2.9344775608398929595947265625 0\times10^{10}}{(-3.4745779351749382019042968750 0\times10^{10})} \text{ Hz.T}^{-1} \quad 238$$

$$g_{On} = 2\cdot\frac{2\cdot m_n}{-q}\cdot\gamma_{On} = \frac{2.0000000000000000000000000000 0}{(1.9999999999999999555910790149 94 \approx 2)} \quad 239$$

Nucleus: Gyromagnetic ratios and Landé factors of tritium

Is given the gyromagnetic ratio γ_{NT} and Landé factor g_{NT} of the tritium nucleus by

the resultant of the angular momentum is

$$\varphi_{NT} = \sqrt{(\varphi_{op1} + \varphi_{sp2} - \varphi_{on})^2 + \left(\sqrt{(\varphi_{sp1})^2 + (\varphi_{op2})^2} - \varphi_{sn}\right)^2} = $$

$$= \frac{3.8010255754994577162422903778 0\times10^{-34}}{(3.7865465025921675292508037811 2\times10^{-34})} \text{ kg.m}^2\text{.s}^{-1}. \quad 240$$

the resultant of the magnetic moment is

$$\eta_{NT} = \sqrt{(\eta_{op1} + \eta_{sp2} + \eta_{on})^2 + \left(\sqrt{(\eta_{sp1})^2 + (\eta_{op2})^2} + \eta_{sn}\right)^2} = $$

$$= \frac{1.4692040671369756404646481616 786\times10^{-25}}{(1.2548048749755761796326554113 7\times10^{-25})} \text{ A.m}^2. \quad 241$$

then

$$\gamma_{NT} = \frac{\eta_{NT}}{\varphi_{NT}} = \frac{3.8652832977687108516693115234 4\times10^{8}}{(3.3138504283958232402801513671 9\times10^{8})} \text{ Hz.T}^{-1} \quad 242$$

$$g_{NT} = \frac{2(3\cdot m_p + 2\cdot m_n)}{q}\cdot\gamma_{NT} = \frac{30.454442983090586949401767924 4}{(26.209209014678894078542725765 1)} \quad 243$$

Atom: Gyromagnetic ratios and Landé factors of tritium

Is given the gyromagnetic ratio γ_T and Landé factor g_T of tritium atom by

the resultant of the angular momentum is

$$\varphi_T = \sqrt{\left(\varphi_{op1} + \varphi_{sp2} - \varphi_{on} - \varphi_{oe}\right)^2 + \left(\sqrt{\left(\varphi_{sp1}\right)^2 + \left(\varphi_{op2}\right)^2} - \varphi_{sn} - \varphi_{se}\right)^2} = \\ = \frac{2.33630408842062002379434701607 \times 10^{-34}}{\left(2.32383084435449521647806721523 \times 10^{-34}\right)} \text{ kg.m}^2\text{.s}^{-1}. \quad 244$$

the resultant of the magnetic moment is

$$\eta_T = \sqrt{\left(\eta_{op1} + \eta_{sp2} + \eta_{on} + \eta_{oe}\right)^2 + \left(\sqrt{\left(\eta_{sp1}\right)^2 + \left(\eta_{op2}\right)^2} + \eta_{sn} + \eta_{se}\right)^2} = \\ = \frac{1.32242347855536070773451477992 \times 10^{-23}}{\left(1.31950969417952874383528139112 \times 10^{-23}\right)} \text{ A.m}^2. \quad 245$$

then

$$\gamma_T = \frac{\eta_T}{\varphi_T} = \frac{5.66032258005138702392578125000 \times 10^{10}}{\left(5.67816585008818511962890625000 \times 10^{10}\right)} \text{ Hz.T}^{-1} \quad 246$$

$$g_T = \frac{2\left(3 \cdot m_p + 2 \cdot m_n + m_e\right)}{q} \cdot \gamma_T = \frac{3544.03778462396394388633780181}{\left(3560.60960370100610816734842956\right)} \quad 247$$

Gyromagnetic ratios of Tritium

Summary of Tritium

It is regrettable on this Physics field contains very few variables to compare with the obtained data of experimental physics, whereby it does not carry out any comparison or whatever comment.

First part - Calculations performed according to NIST constants

Table 1: The orbital gyromagnetic ratios and Landé factor of tritium.

Particle in orbit	Gyromagnetic ratio Hz.T^{-1}	Landé factor
Electron	$-8.7941005463970687866210937500 \times 10^{10}$	0.9999…≈1.
Protons	$4.7894168789666131138801574707 0\times 10^{7}$	3.
Negatron	$-3.4745779351749382019042968750 0\times 10^{10}$	1.9999…≈2.

Table 2: The nuclear gyromagnetic ratios and Landé factor of tritium.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$3.3138504283958232402801513671 9\times 10^{8}$	Hz.T^{-1}
Landé factor	26.209209014678894078542725765 1	Dimensionless

Table 3: The atomic gyromagnetic ratios and Landé factor of the tritium.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$5.6781658500881851196289062500 0\times 10^{10}$	Hz.T^{-1}
Landé factor	3560.6096037010061081673484295 6	Dimensionless

Second part - Calculations carried out according to the corrected constants.

Table 4: The orbital gyromagnetic ratios and Landé factor of tritium.

Particle in orbit	Gyromagnetic ratio Hz.T^{-1}	Landé factor
Electron	$-8.8034326825196792602539062500 0\times 10^{10}$	0.9999≈1.
Protons	$4.7975109986483283340930938720 7\times 10^{7}$	3.
Negatron	$-2.9344775608398929595947265625 0\times 10^{10}$	2.

Table 5: The nuclear gyromagnetic ratios and Landé factor of tritium.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$3.8652832977687108516693115234 4\times 10^{8}$	Hz.T^{-1}
Landé factor	30.454442983090586949401767924 4	Dimensionless

Table 6: The atomic gyromagnetic ratios and Landé factor of the tritium.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$5.6603225800513870239257812500 0\times 10^{10}$	Hz.T^{-1}
Landé factor	3544.0377846239639438863378018 1	Dimensionless

Gyromagnetic ratios of Tritium

Important note:

In the determination of magnetic fields's magnitude and intensity in the Magnetic Resonance System especially, it is suitable to use a Hydrogen 1 test-tube in the setup (*to avoid interactions among different atoms*) and use the gyromagnetic ratios values calculated for proton and electron (see *Gyromagnetic ratios of Hydrogen 1 and elementary particles*, expressions **116**, **120** and **124**).

This is because the calculated values are so much for NIST as well as QEDa, these can only suffer minimal corrections in the future.

Gyromagnetic ratios of Tritium

Last page of report.