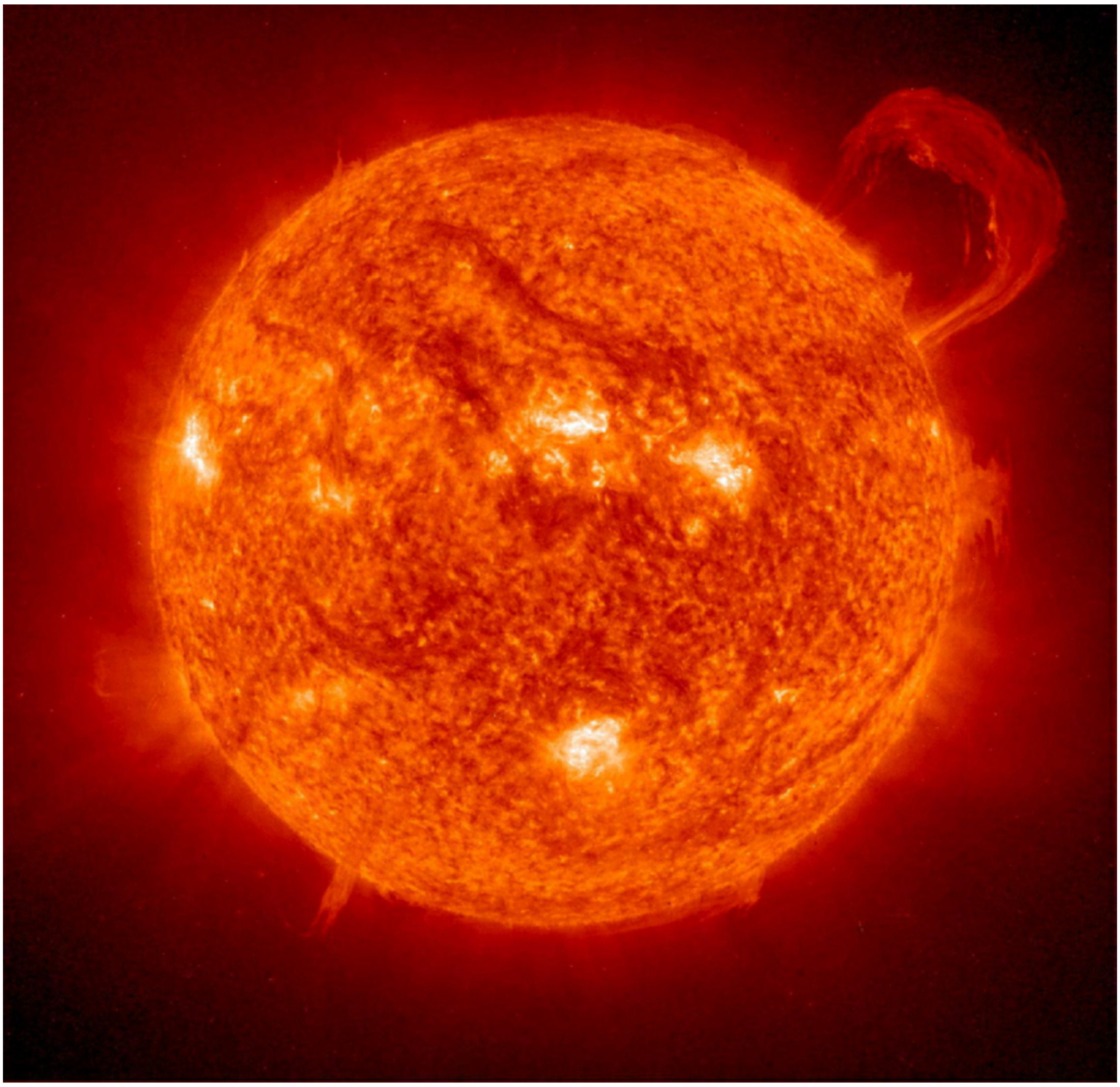
THE HELIUM FAMILY

STABILITY and GYROMAGNETIC RATIOS

Daniel Eduardo Caminoa Lizarralde

Cordoba, Argentina, 6/10/2007



Original title: **THE HELIUM 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

As I already mentioned to you in the previous report "*The Hydrogen family stability and gyromagnetic ratios*", the final objective that accomplishes the first work is to find the laws that regulate the continuous nuclear fusion with elementary substances in the hydrogen family.

I had given the first step with the publication of *"QEDa Theory – The atom and their nucleus"*. The second step was the publication of the laws that regulate the nuclear stability of hydrogen family. The third step is the current work with the publication of the laws that regulate the nuclear stability of helium family. I will give the fourth step: it's prepared the edition of the laws that regulate the continuous nuclear fusion.

In this work I expose for the first time, a new physical constant of screening in the electric interaction between electrons, due to the interference in permanent mode of atomic nucleus among two electrons of the complete orbital (see the expressions 2 and following).

At this time, I use different expressions of calculation for oneself variable or magnitude with the objective that they can appreciate the precision of QEDa's theory; for this reason you will observe small differences that don't overcome the 1/10,000,000,000 part, for example the orbit radius of electron in the normal helium in expressions 6 and 128 or in the ionized helium expressions 13 and 129, etc.

With the purpose of avoiding complexity, I have written the magnitudes of gyromagnetic ratios and Landé factors in absolute values and without sign.

Due to the tiny value I believe convenient to leave thus it and do not to increase the precision of calculations.

I comment to you that there are situations that I don't succeed in understanding, some people criticized my first work to include comments that didn't make to the principal objective, now they tell me in the last work lacks explanatory details of mathematical deductions. I don't understand them!

I apologize again the briefness of the report and my English usage.

Sincerely,

Cordoba – Argentina, June 10, 2007

Daniel Eduardo Caminoa Lizarralde

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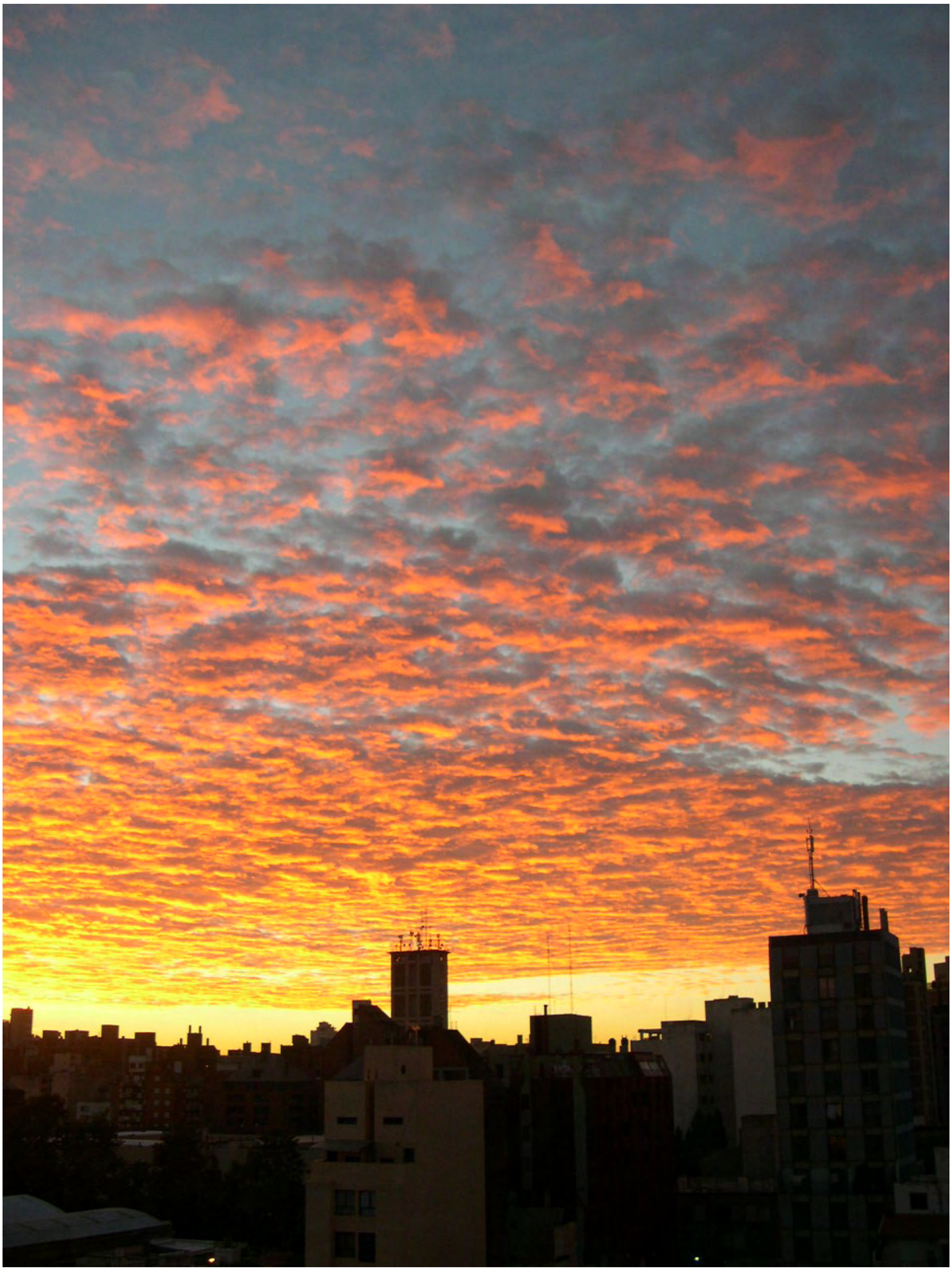
ATOMIC AND NUCLEAR STABILITY OF THE HELIUM FAMILY



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Initial note on helium family stability

This publication correct and update the magnitudes given for helium 3 $^{3}\boldsymbol{He}$, helium 4 $^{4}\boldsymbol{He}$, helium 5 $^{5}\boldsymbol{He}$ and helium 6 $^{6}\boldsymbol{He}$ on the initial version of "*QEDa Theory – The atom and their nucleus*." QEDa is Quantum Electro-Dynamics - atomic.

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 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 in *The Hydrogen family – Stability and gyromagnetic ratios* on page 15):

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

$$=9.09972613967573395576494168765810157681571937691372670611564\times10^{-31}\ \mathrm{kg}.$$

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.

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Helium family - Electronic stability

The electronic stability is also dynamic-potential. For more detail, see "*QEDa Theory – The atom and their nucleus*".

These calculated electronic magnitudes are exactly valid for helium 3, helium 4, helium 5 and helium 6.

We have two equilibrium situations, one with two electrons in orbit both disposed to 180°, and another with only one electron in orbit (case of the ionized helium). The dynamic equilibrium of electrons in the normal helium (with two electrons in orbit both disposed to 180°) exists if it is achieve in the following condition.

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

And for QEDa we know

$$\overline{v_e} = \frac{c \cdot Q_e^v}{\left(l_e^v\right)^2} \qquad 3 \qquad r_e = \frac{h \cdot Q_e^v}{2 \cdot \pi \cdot c \cdot m_e} \qquad 4$$

where F_{Ne}^{e} is the electric interaction between nucleus and electrons resultant, F_e^i is the inertial electronic resultant, F_{ee}^{e} is the electric interaction between electrons resultant, k_e is the electric constant, q is the elementary charge, r_e is the orbit radius of electrons, m_e is the inertial mass of electron, k_s is the electronic constant of screening determined by the interference of nucleus (their magnitude is 0.9197, it determines a decrease of the 8 % approximately in the electric interaction between electrons resultant), $\overline{v_e}$ 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 the quantum state of the electron (the bigger integer most closest whereby the value has been calculated) and h is the constant of Planck.

Then, if we solve the system of equations **2**, **3** and **4** we can know the orbit radius of electrons in the normal helium, the quantum state of electrons and the medium tangential speed of electrons, the results will be following

$$Q_e^v = \sqrt[3]{\frac{(4-k_s)\cdot \pi \cdot k_e \cdot q^2 \cdot \left(l_e^v\right)^4}{2 \cdot c \cdot h}} = \frac{174.027086445491562471943325363}{(174.027086445491562471943325363)} \qquad \text{and} \qquad l_e^v = 175. \qquad 5$$

$$r_e = \frac{1}{2 \cdot m_e} \cdot \sqrt[3]{\frac{(4-k_s)\cdot k_e \cdot q^2 \cdot h^2 \cdot \left(l_e^v\right)^4}{2 \cdot \pi^2 \cdot c^4}} = \frac{6.72734855086645131219599170081\times 10^{-11}}{(6.72021718124223961176464697982\times 10^{-11})} \text{ meter} \qquad 6$$

$$\overline{v_e} = \sqrt[3]{\frac{(4-k_s)\cdot \pi \cdot c^2 \cdot k_e \cdot q^2}{2 \cdot h \cdot \left(l_e^v\right)^2}} = \frac{1.70357577156154741533100605011\times 10^{6}}{(1.70357577156154741533100605011\times 10^{6})} \text{ m.s}^{-1} \qquad 7$$

Is established the electronic energy resultant E of normal helium family (with two electrons in orbit both disposed to 180°) by following relationship:

$$E = \frac{m_e \cdot c^2}{2 \cdot \left(l_e^v\right)^4} \cdot \sqrt[3]{\left(\frac{(4-k_s)\cdot \pi \cdot k_e \cdot q^2 \cdot \left(l_e^v\right)^4}{2 \cdot c \cdot h}\right)^2} - \frac{4 \cdot k_e \cdot q^2 \cdot m_e}{\sqrt[3]{\frac{(4-k_s)\cdot k_e \cdot q^2 \cdot h^2 \cdot \left(l_e^v\right)^4}{2 \cdot \pi^2 \cdot c^4}}} + \frac{k_s \cdot k_e \cdot q^2 \cdot m_e}{\sqrt[3]{\frac{(4-k_s)\cdot k_e \cdot q^2 \cdot h^2 \cdot \left(l_e^v\right)^4}{2 \cdot \pi^2 \cdot c^4}}} \qquad 8$$

Then, the theoretic value of the wave frequency for the Lyman's quantum skip ${}^{1}S \leftarrow {}^{2}S$ of normal helium family is:

$$E_{{}^{1}S}\left[\text{with } l_e^v = 175\right] = \frac{-3.961343390502 \times 10^{-18}}{(-3.965547094514 \times 10^{-18})} \text{ Joule.} = \frac{-24.724762323799}{(-24.750999782239)} \text{ eV.}$$

$$E_{{}^{2}S}\left[\text{with } l_e^v = 175^2\right] = \frac{-4.046924412001 \times 10^{-21}}{(-4.051218933003 \times 10^{-21})} \text{ Joule.} = \frac{-0.025258917081}{(-0.025285721374)} \text{ eV.} \quad 9$$

$$f_{\text{Lyman-He}}\left({}^{1}S \leftarrow {}^{2}S\right) \text{ s}^{-1} = \frac{\left(E_{{}^{2}S} - E_{{}^{1}S}\right) \text{ Joule.}}{h \text{ Joule.sec.}} = \frac{5.970277873027652000000000000000 \times 10^{15}}{(5.976613420990396000000000000000 \times 10^{15})} \text{ Herz.} \quad 10$$

where $E_{{}^{1}S}$ is the energy magnitude in the fundamental state, $E_{{}^{2}S}$ is the energy magnitude in the quantum following state to the fundamental state and $f_{\text{Lyman-He}}$ is the wave frequency for the Lyman's quantum skip ${}^{1}S \leftarrow {}^{2}S$ of normal helium family.

The dynamic equilibrium of electron in the ionized helium (with only an electron in orbit) exists if it is achieves in the following condition.

$$2 \cdot F_{Ne}^{e} - F_e^{i} = 0 \qquad \text{then} \qquad \frac{2 \cdot k_e \cdot q^2}{r_e^2} - \frac{m_e \cdot \left(\overline{v_e}\right)^2}{r_e} = 0 \quad 11$$

Then, if we solve the system of equations **11**, **3** and **4** we can know the orbit radius of electron in the ionized helium, the quantum state of electron and the medium tangential speed of electron, the results will be following

$$Q_e^v = \sqrt[3]{\frac{4 \cdot \pi \cdot k_e \cdot q^2 \cdot \left(l_e^v\right)^4}{c \cdot h}} = \frac{67.828205150502540732304623816 2}{(67.8282051505025407323046238162)} \quad \text{and} \quad l_e^v = 68. \quad 12$$

$$r_e = \frac{1}{m_e} \cdot \sqrt[3]{\frac{k_e \cdot q^2 \cdot h^2 \cdot \left(l_e^v\right)^4}{2 \cdot \pi^2 \cdot c^4}} = \frac{2.62202848388218226979600012295 \times 10^{-11}}{(2.61924898551928459313953437688 \times 10^{-11})} \text{ meter} \quad 13$$

$$\overline{v_e} = \sqrt[3]{\frac{4 \cdot \pi \cdot c^2 \cdot k_e \cdot q^2}{h \cdot \left(l_e^v\right)^2}} = \frac{4.39757446881431993097066879272 \times 10^{6}}{(4.39757446881431993097066879272 \times 10^{6})} \text{ m.s}^{-1} \quad 14$$

The theoretic value of the wave frequency for the Lyman's quantum skip ${}^{1}S \leftarrow {}^{2}S$ of ionized helium family (with only one electron in orbit) is:

$$E = \frac{m_e \cdot c^2}{\left(l_e^v\right)^4} \cdot \sqrt[3]{2 \cdot \left(\frac{\pi \cdot k_e \cdot q^2 \cdot \left(l_e^v\right)^4}{c \cdot h}\right)^2} - \frac{2 \cdot k_e \cdot q^2 \cdot m_e}{\sqrt[3]{\frac{k_e \cdot q^2 \cdot h^2 \cdot \left(l_e^v\right)^4}{2 \cdot \pi^2 \cdot c^4}}} \qquad \text{then} \quad 15$$

$$E_{{}^{1}S}\left[\text{with } l_e^v = 68\right] = \frac{-8.798826045388 \times 10^{-18}}{(-8.808163196122 \times 10^{-18})} \text{ Joule.} = \frac{-54.917956171707}{(-54.976234086527)} \text{ eV.}$$

$$E_{{}^{2}S}\left[\text{with } l_e^v = 68^2\right] = \frac{-3.170147830636 \times 10^{-20}}{(-3.173511932618 \times 10^{-20})} \text{ Joule.} = \frac{-0.197865077367}{(-0.198075048110)} \text{ eV.} \quad 16$$

$$f_{\text{Lyman-He}}\left({}^{1}S \leftarrow {}^{2}S\right) \text{ s}^{-1} = \frac{\left(E_{{}^{2}S} - E_{{}^{1}S}\right) \text{ Joule.}}{h \text{ Joule.sec.}} = \frac{1.323125999766003600000000000000 \times 10^{16}}{(1.324530076495855200000000000000 \times 10^{16})} \text{ Herz.} \quad 17$$

Helium 3 nuclear stability

The nuclear stability of helium 3 (^{3}He) is also dynamic-potential. Three protons and one internal negatron comprise the nucleus and two more peripheral electrons integrates the helium 3 atom. The orbits of helium 3 belong and they are on two planes disposed in perpendicular mode, and in a same mode that in tritium. For more detail, see "*QEDa Theory – The atom and their nucleus*" and "*The Hydrogen family stability and gyromagnetic ratios*".

At nuclear level in helium 3, the following interactions exist.

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

$$F_{pp}^{e} = \frac{5 \cdot k_e \cdot q^2}{4 \cdot r_p^2} \qquad 18$$

where r_p is the orbit radius of protons.

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

$$F_{pp}^{m} = \frac{2 \cdot \mu_0 \cdot m_p \cdot q^2 \cdot c^3 \cdot \left(l_p^v\right)^2 \cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right] \cdot \sqrt{1 - \frac{4 \cdot \pi^2 \cdot c^2 \cdot m_p^2 \cdot r_p^2}{h^2 \cdot \left(l_p^v\right)^4}}}{\pi^2 \cdot h \cdot r_p} \qquad 19$$

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:

$$F_p^i = \frac{12 \cdot \pi^2 \cdot c^4 \cdot m_p^3 \cdot r_p}{h^2 \cdot \left(l_p^v\right)^4} \qquad 20$$

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

$$F_n^i = \frac{c^2 \cdot m_n}{r_n} \qquad 21$$

where r_n is the orbit radius of negatron and m_n is the inertial mass of negatron.

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

$$F_{pn}^{e} = \frac{6 \cdot k_e \cdot q^2 \cdot r_n \cdot r_p}{\left(r_n^2 - r_p^2\right)^2} \qquad 22$$

The Helium family - Stability and Gyromagnetic ratios

If the following condition is completed is given to the dynamic equilibrium of helium 3 nucleus. The electric interaction between the protons resultant plus the spin magnetic interaction between protons resultant, minus the inertial negatronic resultant and minus the inertial protonic resultant, it should be necessarily equal to zero. Is enunciated this condition for the protons in the next expression.

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

$$\frac{5 \cdot k_e \cdot q^2}{4 \cdot r_p^2} + \frac{2 \cdot \mu_0 \cdot m_p \cdot q^2 \cdot c^3 \cdot \left(l_p^v\right)^2 \cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right] \cdot \sqrt{1 - \frac{4 \cdot \pi^2 \cdot c^2 \cdot m_p^2 \cdot r_p^2}{h^2 \cdot \left(l_p^v\right)^4}}}{\pi^2 \cdot h \cdot r_p} = \frac{c^2 \cdot m_n}{r_n} + \frac{12 \cdot \pi^2 \cdot c^4 \cdot m_p^3 \cdot r_p}{h^2 \cdot \left(l_p^v\right)^4} \qquad 23$$

Another condition that should be satisfied, it's the negatronic dynamic equilibrium. The inertial negatronic resultant minus the electric interaction between protons and negatron resultant, it should be necessarily equal to zero. Is enunciated this condition for the only negatron in the following expression.

$$F_n^i - F_{pn}^e = 0 \qquad \text{then} \qquad \frac{c^2 \cdot m_n}{r_n} = \frac{6 \cdot k_e \cdot q^2 \cdot r_n \cdot r_p}{\left(r_n^2 - r_p^2\right)^2} \qquad 24$$

Then, if we solve this system of equations **23** and **24**, we can know the orbit radius of protons and quantum state; the results will be following

$$r_p = \frac{h \cdot k_{{}^3He-p}}{2 \cdot \pi \cdot c \cdot m_p} \cdot \sqrt[3]{\frac{m_p \cdot A}{m_n (A - Z)}} = \frac{4.038644317989003158297439696\,31 \times 10^{-15}}{(4.131049684902021084519137325\,95 \times 10^{-15})} \text{ meter} \qquad \text{then} \qquad 25$$

$$Q_p^v = k_{{}^3He-p} \cdot \sqrt[3]{\frac{m_p \cdot A}{m_n (A - Z)}} = \frac{19.1709924023083679855972150108}{(19.6427706295181891960055509117)} \qquad \text{and} \qquad l_p^v = 20. \qquad 26$$

where r_p is the orbit radius of protons, 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 closely whereby the value has been calculated), $k_{{}^3He-p}$ is a calculation constant for the protons of helium 3 with the magnitude 1.5157323559274726854084747 1741 inside calculations of **NIST** and the magnitude 1.5659067837450539872889976 3228 for the calculations inside of **QEDa**, A is the masic number (quantity of protons) and $(A - Z)$ is the negatrons quantity. In addition, the negatron results will be following:

$$r_n = \frac{h \cdot k_{{}^3He-n}}{2 \cdot \pi \cdot c \cdot m_n} \cdot \sqrt[3]{\frac{m_n (A - Z)}{m_p \cdot A}} = \frac{2.304457107757724944766916231\,87 \times 10^{-15}}{(2.268756347053856265024062094\,75 \times 10^{-15})} \text{ meter} \qquad \text{then} \qquad 27$$

$$Q_n^r = \frac{1}{k_{{}^3He-n} \cdot \sqrt[3]{\frac{m_n (A - Z)}{m_p \cdot A}}} = \frac{55.9161416449216872592842264567}{(67.2495267709597044358815765008)} \qquad \text{and} \qquad l_n^r = \frac{55.}{(67.)} \qquad 28$$

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). $k_{{}^3He-n}$ is a calculation constant for the negatron of helium 3 with the magnitude 0.192704116170259731610769904364 inside calculations of **NIST** and the magnitude 0.218948257482831448728077816668 for the calculations inside of **QEDa**.

The magnitudes of the nuclear interactions according to the quantum state of helium 3 nucleus and the orbit radius of nuclear particles are:

- The electric interaction between protons resultant is:

$$F_{pp}^{e}=\frac{5\cdot k_e\cdot q^2}{4\cdot r_p^2}=\frac{17.680760306602014253485322115 0}{(16.898622847840456984158663544 8)}\ \text{Newton} \qquad 29$$

- The spin magnetic interaction between protons resultant is:

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

$$=\frac{344.859188531542088185233296826}{(337.695612787314871638955082744)}\ \text{Newton} \qquad 30$$

- The inertial protonic resultant is:

$$F_{p}^{i}=\frac{12\cdot\pi^2\cdot c^4\cdot m_p^3\cdot r_p}{h^2\cdot\left(l_p^v\right)^4}=\frac{256.071150192400239120615879074}{(263.260365423365556125645525753)}\ \text{Newton} \qquad 31$$

- The inertial negatronic resultant is:

$$F_{n}^{i}=\frac{c^2\cdot m_n}{r_n}=\frac{106.468798645743945030517352279}{(91.333870211789786708322935737 7)}\ \text{Newton} \qquad 32$$

- The electric interaction between protons and negatron resultant is:

$$F_{pn}^{e}=\frac{6\cdot k_e\cdot q^2\cdot r_n\cdot r_p}{\left(r_n^2-r_p^2\right)^2}=\frac{106.468798645743959241372067481}{(91.333870211789786708322935737 7)}\ \text{Newton} \qquad 33$$

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

$$\text{Resultant forces of the protonic layer:}\quad \overbrace{F_{pp}^{e}+F_{pp}^{m}}^{\text{compression}}\rightarrow\frac{362.539948838144\ \text{Newton}}{(354.594235635155\ \text{Newton})}\leftarrow\overbrace{F_{n}^{i}+F_{p}^{i}}^{\text{expansion}}$$

and 34

$$\text{Resultant forces of the negatronic layer:}\quad \overbrace{F_{n}^{i}}^{\text{expansion}}\rightarrow\frac{106.468798645744\ \text{Newton}}{(91.3338702117898\ \text{Newton})}\leftarrow\overbrace{F_{pn}^{e}}^{\text{compression}}$$

The calculations with high precision are:

1- Inside of **QEDa:**

$$r_p=4.0386443179890031582974396963115273265715686035786671120626 5\times10^{-15}\ \text{meter} \qquad 35$$

$$r_n=2.3044571077577249447669162318708996942023299035334833137629 2\times10^{-15}\ \text{meter} \qquad 36$$

$$k_{^3He-p}=1.56590678374505398728899763227673247456550598144531250000000\ \text{dimensionless} \qquad 37$$

$$k_{^3He-n}=0.21894825748283144872807781666779192164540290832519531250000\ \text{dimensionless} \qquad 38$$

2- Inside of **NIST:**

$$r_p=4.1310496849020210845191373259457850277339702025498304867527 0\times10^{-15}\ \text{meter} \qquad 39$$

$$r_n=2.2687563470538562650240620947472425047255592606465192413982 1\times10^{-15}\ \text{meter} \qquad 40$$

$$k_{^3He-p}=1.51573235592747268540847471740562468767166137695312500000000\ \text{dimensionless} \qquad 41$$

$$k_{^3He-n}=0.19270411617025973161076990436413325369358062744140625000000\ \text{dimensionless} \qquad 42$$

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Helium 4 nuclear stability

The nuclear stability of helium 4 (^4He) is also dynamic-potential. Four protons on two transverse orbital and two internal negatrons comprises the nucleus and two more peripheral electrons integrates the helium 4 atom. The orbits of helium 4 belong and they are on two planes disposed in perpendicular mode, and in a same mode that in the tritium and helium 3. For more detail, see "*QEDa Theory – The atom and their nucleus*" and "*The Hydrogen family stability and gyromagnetic ratios*".

At nuclear level in helium 4, the following interactions exist.

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

$$F_{pp}^e = \frac{5 \cdot k_e \cdot q^2}{2 \cdot r_p^2} \quad 43$$

where r_p is the orbit radius of protons.

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

$$F_{pp}^m = \frac{4 \cdot \mu_0 \cdot m_p \cdot q^2 \cdot c^3 \cdot \left(l_p^v\right)^2 \cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right] \cdot \sqrt{1 - \frac{4 \cdot \pi^2 \cdot c^2 \cdot m_p^2 \cdot r_p^2}{h^2 \cdot \left(l_p^v\right)^4}}}{\pi^2 \cdot h \cdot r_p} \quad 44$$

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:

$$F_p^i = \frac{16 \cdot \pi^2 \cdot c^4 \cdot m_p^3 \cdot r_p}{h^2 \cdot \left(l_p^v\right)^4} \quad 45$$

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

$$F_n^i = \frac{2 \cdot c^2 \cdot m_n}{r_n} \quad 46$$

where r_n is the orbit radius of negatrons and m_n is the inertial mass of negatron.

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

$$F_{pn}^e = \frac{8 \cdot k_e \cdot q^2 \cdot r_n \cdot r_p}{\left(r_n^2 - r_p^2\right)^2} \quad 47$$

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

$$F_{nn}^e = \frac{k_e \cdot q^2}{2 \cdot r_n^2} \quad 48$$

The Helium family - Stability and Gyromagnetic ratios

If the following condition is completed is given to the dynamic equilibrium of helium 4 nucleus. The electric interaction between protons resultant plus the spin magnetic interaction between protons resultant, minus the inertial negatronic resultant, minus the electric interaction between negatrons resultant and minus the inertial protonic resultant, it should be necessarily equal to zero. Is enunciated this condition for the protons in the next expression.

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

$$\frac{5\cdot k_e\cdot q^2}{2\cdot r_p^2}+\frac{4\cdot\mu_0\cdot m_p\cdot q^2\cdot c^3\cdot\left(l_p^v\right)^2\cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right]\cdot\sqrt{1-\frac{4\cdot\pi^2\cdot c^2\cdot m_p^2\cdot r_p^2}{h^2\cdot\left(l_p^v\right)^4}}}{\pi^2\cdot h\cdot r_p}=\frac{2\cdot c^2\cdot m_n}{r_n}+\frac{k_e\cdot q^2}{2\cdot r_n^2}+\frac{16\cdot\pi^2\cdot c^4\cdot m_p^3\cdot r_p}{h^2\cdot\left(l_p^v\right)^4} \qquad 49$$

Another condition that should be satisfied, it's the negatronic dynamic equilibrium. The inertial negatronic resultant plus the electric interaction between negatrons resultant and minus the electric interaction between protons and negatrons resultant, it should be necessarily equal to zero. Is enunciated this condition in the following expression.

$$F_{n}^{i}+F_{nn}^{e}-F_{pn}^{e}=0 \quad \text{then} \quad \frac{2\cdot c^2\cdot m_n}{r_n}+\frac{k_e\cdot q^2}{2\cdot r_n^2}=\frac{8\cdot k_e\cdot q^2\cdot r_n\cdot r_p}{\left(r_n^2-r_p^2\right)^2} \qquad 50$$

Then, if we solve this system of equations **49** and **50**, we can know the orbit radius of protons and quantum state; the results will be following

$$r_p=\frac{h\cdot k_{^4He-p}}{2\cdot\pi\cdot c\cdot m_p}\cdot\sqrt[3]{\frac{m_p\cdot A}{m_n\left(A-Z\right)}}=\frac{3.16204492095249088765133529737\times10^{-15}}{(3.23058788760626980461208645587\times10^{-15})}\ \text{meter} \quad \text{then} \qquad 51$$

$$Q_p^v=k_{^4He-p}\cdot\sqrt[3]{\frac{m_p\cdot A}{m_n\left(A-Z\right)}}=\frac{15.0098732105041587914229239686}{(15.3611555694118262493930160417)} \quad \text{and} \quad l_p^v=16. \qquad 52$$

where r_p is the orbit radius of protons, 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 closely whereby the value has been calculated), $k_{^4He-p}$ is a calculation constant for the protons of helium 4 with the magnitude 1.35687784041024150916143753420 inside calculations of **NIST** and the magnitude 1.40344507415914065973083779681 for the calculations inside of **QEDa**, A is the masic number (quantity of protons) and ($A-Z$) is the negatrons quantity. In addition, the negatrons results will be following:

$$r_n=\frac{h\cdot k_{^4He-n}}{2\cdot\pi\cdot c\cdot m_n}\cdot\sqrt[3]{\frac{m_n\left(A-Z\right)}{m_p\cdot A}}=\frac{1.92855240452606092560976474607\times10^{-15}}{(1.91266426833875049275051307821\times10^{-15})}\ \text{meter} \quad \text{then} \qquad 53$$

$$Q_n^r=\frac{1}{k_{^4He-n}\cdot\sqrt[3]{\frac{m_n\left(A-Z\right)}{m_p\cdot A}}}=\frac{66.8150628158293500291620148346}{(79.7697710066495631053840043023)} \quad \text{and} \quad l_n^r=\frac{66.}{(79.)} \qquad 54$$

where r_n is the orbit radius of negatrons, Q_n^r is the quantum radial number calculated for negatrons and l_n^r is the quantum state of the negatrons (the smaller integer most closest whereby the value has been calculated). $k_{^4He-n}$ is a calculation constant for the negatrons of helium 4 with the magnitude 0.141920388783283668576729041888 inside calculations of **NIST** and the magnitude 0.160068996445161398911594119454 for the calculations inside of **QEDa**.

The magnitudes of the nuclear interactions according to the quantum state of the helium 4 nucleus and the orbit radius of the nuclear particles are:

- The electric interaction between protons resultant is:

$$F_{pp}^{e}=\frac{5\cdot k_e\cdot q^2}{2\cdot r_p^2}=\frac{57.685422109741082863365591038 0}{(55.263581200862354592118208529 4)}\ \text{Newton} \quad (55)$$

- The spin magnetic interaction between protons resultant is:

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

$$=\frac{880.4090939650837981389486230 91}{(863.1153860464160061383154243 23)}\ \text{Newton} \quad (56)$$

- The inertial protonic resultant is:

$$F_p^{i}=\frac{16\cdot\pi^2\cdot c^4\cdot m_p^3\cdot r_p}{h^2\cdot\left(l_p^v\right)^4}=\frac{652.6372672873909550617099739 61}{(670.1706599692067811702145263 55)}\ \text{Newton} \quad (57)$$

- The inertial negatronic resultant is:

$$F_n^{i}=\frac{2\cdot c^2\cdot m_n}{r_n}=\frac{254.4424296874689446212869370 36}{(216.6760797219971550475747790 19)}\ \text{Newton} \quad (58)$$

- The electric interaction between protons and negatrons resultant is:

$$F_{pn}^{e}=\frac{8\cdot k_e\cdot q^2\cdot r_n\cdot r_p}{\left(r_n^2-r_p^2\right)^2}=\frac{285.4572487874339685731683857 74}{(248.2083072780714303462445968 76)}\ \text{Newton} \quad (59)$$

- The electric interaction between negatrons resultant is:

$$F_{nn}^{e}=\frac{k_e\cdot q^2}{2\cdot r_n^2}=\frac{31.014819099965063031731915543 8}{(31.532227556074293062238211859 9)}\ \text{Newton} \quad (60)$$

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

$$\text{Resultant forces of the protonic layer:}\quad \overbrace{F_{pp}^{e}+F_{pp}^{m}}^{\text{compression}}\rightarrow\frac{938.094516074825\ \text{Newton}}{(918.378967247278\ \text{Newton})}\leftarrow\overbrace{F_n^{i}+F_{nn}^{e}+F_p^{i}}^{\text{expansion}}$$

and (61)

$$\text{Resultant forces of the negatronic layer:}\quad \overbrace{F_n^{i}+F_{nn}^{e}}^{\text{expansion}}\rightarrow\frac{285.457248787434\ \text{Newton}}{(248.208307278071\ \text{Newton})}\leftarrow\overbrace{F_{pn}^{e}}^{\text{compression}}$$

The calculations with high precision are:

1- Inside of **QEDa:**

$$r_p=3.16204492095249088765133529737393507371152693186436652830361\times10^{-15}\ \text{meter} \quad (62)$$

$$r_n=1.92855240452606092560976474606700632756716210027340068106176\times10^{-15}\ \text{meter} \quad (63)$$

$$k_{^4He-p}=1.40344507415914065973083779681473970413208007812500000000000\ \text{dimensionless} \quad (64)$$

$$k_{^4He-n}=0.16006899644516139891159411945409374311566352844238281250000\ \text{dimensionless} \quad (65)$$

2- Inside of **NIST:**

$$r_p=3.23058788760626980461208645586691302537139670050297790614920\times10^{-15}\ \text{meter} \quad (66)$$

$$r_n=1.91266426833875049275051307821321099638131391765495120318015\times10^{-15}\ \text{meter} \quad (67)$$

$$k_{^4He-p}=1.35687784041024150916143753420328721404075622558593750000000\ \text{dimensionless} \quad (68)$$

$$k_{^4He-n}=0.14192038878328366857672904188802931457757949829101562500000\ \text{dimensionless} \quad (69)$$

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Helium 5 nuclear stability

The nuclear stability of helium 5 (^5He) is also dynamic-potential. Five protons on three oblique orbital and three internal negatrons on two tranverse orbital comprise the nucleus and two more peripheral electrons integrates the helium 5 atom. For more detail, see "*QEDa Theory – The atom and their nucleus*" and "*The Hydrogen family stability and gyromagnetic ratios*".

At nuclear level in helium 5, the following interactions exist.

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

$$F_{pp}^{e}=\frac{k_e\cdot q^2}{r_p^2}\left(\frac{3(A-2)}{\left(2\cdot Sin\left[\frac{\pi\left(1+\sqrt{5}\right)}{A}\right]\right)^2}+\frac{A^2-7A+12}{2\cdot\left(1+\frac{2}{A}\right)^2}\right) \quad 70$$

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

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

$$F_{pp}^{m}=\frac{4\cdot\mu_0\cdot m_p\cdot q^2\cdot c^3\cdot\left(l_p^v\right)^2\cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right]\cdot\sqrt{1-\frac{4\cdot\pi^2\cdot c^2\cdot m_p^2\cdot r_p^2}{h^2\cdot\left(l_p^v\right)^4}}}{\pi^2\cdot h\cdot r_p} \quad 71$$

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:

$$F_p^i=\frac{20\cdot\pi^2\cdot c^4\cdot m_p^3\cdot r_p}{h^2\cdot\left(l_p^v\right)^4} \quad 72$$

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

$$F_n^i=\frac{3\cdot c^2\cdot m_n}{r_n} \quad 73$$

where r_n is the orbit radius of negatrons and m_n is the inertial mass of negatron.

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

$$F_{pn}^{e}=\frac{12\cdot k_e\cdot q^2\cdot r_n\cdot r_p}{\left(r_n^2-r_p^2\right)^2} \quad 74$$

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

$$F_{nn}^{e}=\frac{5\cdot k_e\cdot q^2}{4\cdot r_n^2} \quad 75$$

The Helium family - Stability and Gyromagnetic ratios

If the following condition is completed is given to the dynamic equilibrium of helium 5 nucleus. The electric interaction between protons resultant plus the spin magnetic interaction between protons resultant, minus the inertial negatronic resultant, minus the electric interaction between negatrons resultant and minus the inertial protonic resultant, it should be necessarily equal to zero. Is enunciated this condition for the protons in the next expression.

$$F_{pp}^{e}+F_{pp}^{m}-F_{n}^{i}-F_{nn}^{e}-F_{p}^{i}=0 \qquad \text{then} \qquad 76$$

$$\frac{k_e\cdot q^2}{r_p^2}\left(\frac{3(A-2)}{\left(2\cdot Sin\left[\frac{\pi\left(1+\sqrt{5}\right)}{A}\right]\right)^2}+\frac{A^2-7A+12}{2\cdot\left(1+\frac{2}{A}\right)^2}\right)+\frac{4\cdot\mu_0\cdot m_p\cdot q^2\cdot c^3\cdot\left(l_p^v\right)^2\cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right]\cdot\sqrt{1-\frac{4\cdot\pi^2\cdot c^2\cdot m_p^2\cdot r_p^2}{h^2\cdot\left(l_p^v\right)^4}}}{\pi^2\cdot h\cdot r_p}=$$

$$=\frac{3\cdot c^2\cdot m_n}{r_n}+\frac{5\cdot k_e\cdot q^2}{4\cdot r_n^2}+\frac{20\cdot\pi^2\cdot c^4\cdot m_p^3\cdot r_p}{h^2\cdot\left(l_p^v\right)^4}$$

Another condition that should be satisfied, it's the negatronic dynamic equilibrium. The inertial negatronic resultant plus the electric interaction between negatrons resultant and minus the electric interaction between protons and negatrons resultant, it should be necessarily equal to zero. Is enunciated this condition in the following expression.

$$F_{n}^{i}+F_{nn}^{e}-F_{pn}^{e}=0 \qquad \text{then} \qquad \frac{3\cdot c^2\cdot m_n}{r_n}+\frac{5\cdot k_e\cdot q^2}{4\cdot r_n^2}=\frac{12\cdot k_e\cdot q^2\cdot r_n\cdot r_p}{\left(r_n^2-r_p^2\right)^2} \qquad 77$$

Then, if we solve this system of equations **76** and **77**, we can know the orbit radius of protons and quantum state; the results will be following

$$r_p=\frac{h\cdot k_{^5He-p}}{2\cdot\pi\cdot c\cdot m_p}\cdot\sqrt[3]{\frac{m_p\cdot A}{m_n(A-Z)}}=\frac{4.40376444510688055471265776922\times10^{-15}}{(4.13191452232807223115759260864\times10^{-15})}\ \text{meter} \qquad \text{then} \qquad 78$$

$$Q_p^v=k_{^5He-p}\cdot\sqrt[3]{\frac{m_p\cdot A}{m_n(A-Z)}}=\frac{20.9041767661129362920746643795}{(19.6468828538891138180133566493)} \qquad \text{and} \qquad l_p^v=\frac{21.}{(20.)} \qquad 79$$

where r_p is the orbit radius of protons, 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 closely whereby the value has been calculated), $k_{^5He-p}$ is a calculation constant for the protons of helium 5 with the magnitude 1.84418407209236678845343249122 inside calculations of **NIST** and the magnitude 2.07704169449747189091226573510 for the calculations inside of **QEDa**, A is the masic number (quantity of protons) and $(A-Z)$ is the negatrons quantity. In addition, the negatrons results will be following:

$$r_n=\frac{h\cdot k_{^5He-n}}{2\cdot\pi\cdot c\cdot m_n}\cdot\sqrt[3]{\frac{m_n(A-Z)}{m_p\cdot A}}=\frac{2.89036583884015096428057451552\times10^{-15}}{(2.60407115251216376946294760175\times10^{-15})}\ \text{meter} \qquad \text{then} \qquad 80$$

$$Q_n^r=\frac{1}{k_{^5He-n}\cdot\sqrt[3]{\frac{m_n(A-Z)}{m_p\cdot A}}}=\frac{44.5813288824833122703239496332}{(58.5901005626498161404924758244)} \qquad \text{and} \qquad l_n^r=\frac{44.}{(58.)} \qquad 81$$

where r_n is the orbit radius of negatrons, Q_n^r is the quantum radial number calculated for negatrons and l_n^r is the quantum state of the negatrons (the smaller integer most closest whereby the value has been calculated). $k_{^5He-n}$ is a calculation constant for the negatrons of helium 5 with the magnitude 0.18182983534026872507460836914 1 inside calculations of **NIST** and the magnitude 0.22575368323803110537362215382 0 for the calculations inside of **QEDa**.

The magnitudes of the nuclear interactions according to the quantum state of the helium 5 nucleus and the orbit radius of the nuclear particles are:

- The electric interaction between protons resultant is:

$$F_{pp}^{e}=\frac{k_e\cdot q^2}{r_p^2}\left(\frac{3(A-2)}{\left(2\cdot Sin\left[\frac{\pi\left(1+\sqrt{5}\right)}{A}\right]\right)^2}+\frac{A^2-7A+12}{2\cdot\left(1+\frac{2}{A}\right)^2}\right)=$$

$$=\frac{39.489257661249951070203678682 4}{(44.856406006098147543070808751 5)}\ \text{Newton} \qquad 82$$

- The spin magnetic interaction between protons resultant is:

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

$$=\frac{632.55023672995559991250047460 2}{(675.24951990303713955654529854 7)}\ \text{Newton} \qquad 83$$

- The inertial protonic resultant is:

$$F_p^i=\frac{20\cdot\pi^2\cdot c^4\cdot m_p^3\cdot r_p}{h^2\cdot\left(l_p^v\right)^4}=\frac{382.86060351412493218958843499 4}{(438.85913186573827715619700029 5)}\ \text{Newton} \qquad 84$$

- The inertial negatronic resultant is:

$$F_n^i=\frac{3\cdot c^2\cdot m_n}{r_n}=\frac{254.65923015343912538810400292 3}{(238.71962662474518879207607824 4)}\ \text{Newton} \qquad 85$$

- The electric interaction between protons and negatrons resultant is:

$$F_{pn}^{e}=\frac{12\cdot k_e\cdot q^2\cdot r_n\cdot r_p}{\left(r_n^2-r_p^2\right)^2}=\frac{289.17889087708050510627799667 4}{(281.24679404339707389226532541 2)}\ \text{Newton} \qquad 86$$

- The electric interaction between negatrons resultant is:

$$F_{nn}^{e}=\frac{5\cdot k_e\cdot q^2}{4\cdot r_n^2}=\frac{34.519660723641401034456066554 4}{(42.527167418651870889334531966 6)}\ \text{Newton} \qquad 87$$

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

$$\text{Resultant forces of the protonic layer:}\quad \overbrace{F_{pp}^{e}+F_{pp}^{m}}^{\text{compression}}\rightarrow\frac{672.039494391206\ \text{Newton}}{(720.105925909135\ \text{Newton})}\leftarrow\overbrace{F_n^i+F_{nn}^{e}+F_p^i}^{\text{expansion}}$$

and 88

$$\text{Resultant forces of the negatronic layer:}\quad \overbrace{F_n^i+F_{nn}^{e}}^{\text{expansion}}\rightarrow\frac{289.178890877081\ \text{Newton}}{(281.246794043397\ \text{Newton})}\leftarrow\overbrace{F_{pn}^{e}}^{\text{compression}}$$

The Helium family - Stability and Gyromagnetic ratios

The calculations with high precision for helium 5 are:

1- Inside of **QEDa:**

$$\boldsymbol{r_p} = 4.40376444510688055471265776922181048839488291135740195734846\times 10^{-15}\ \text{meter} \quad \mathbf{89}$$

$$\boldsymbol{r_n} = 2.89036583884015096428057451551899971197678632996219700847684\times 10^{-15}\ \text{meter} \quad \mathbf{90}$$

$$\boldsymbol{k}_{^5\boldsymbol{He-p}} = 2.077041694497471890912265735096298158168792724609375000000000\ \text{dimensionless} \quad \mathbf{91}$$

$$\boldsymbol{k}_{^5\boldsymbol{He-n}} = 0.22575368323803110537362215382017893716692924499511718750000\ \text{dimensionless} \quad \mathbf{92}$$

2- Inside of **NIST:**

$$\boldsymbol{r_p} = 4.13191452232807223115759260863729320568443964658165579345528\times 10^{-15}\ \text{meter} \quad \mathbf{93}$$

$$\boldsymbol{r_n} = 2.60407115251216376946294760174715122527580921623923886915730\times 10^{-15}\ \text{meter} \quad \mathbf{94}$$

$$\boldsymbol{k}_{^5\boldsymbol{He-p}} = 1.84418407209236678845343249122379347681999206542968750000000\ \text{dimensionless} \quad \mathbf{95}$$

$$\boldsymbol{k}_{^5\boldsymbol{He-n}} = 0.18182983534026872507460836914106039330363273620605468750000\ \text{dimensionless} \quad \mathbf{96}$$

Helium 6 nuclear stability

The nuclear stability of helium 6 (^{6}He) is also dynamic-potential. Six protons on three oblique orbital and four internal negatrons on two tranverse orbital comprise the nucleus and two more peripheral electrons integrates the helium 6 atom. For more detail, see "*QEDa Theory – The atom and their nucleus*" and "*The Hydrogen family stability and gyromagnetic ratios*".

At nuclear level in helium 6, the following interactions exist.

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

$$F_{pp}^{e}=\frac{k_e\cdot q^2}{r_p^2}\left(\frac{3(A-2)}{\left(2\cdot Sin\left[\frac{\pi\left(1+\sqrt{5}\right)}{A}\right]\right)^2}+\frac{A^2-7A+12}{2\cdot\left(1+\frac{2}{A}\right)^2}\right) \qquad 97$$

where r_p is the orbit radius of protons.

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

$$F_{pp}^{m}=\frac{6\cdot\mu_0\cdot m_p\cdot q^2\cdot c^3\cdot\left(l_p^v\right)^2\cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right]\cdot\sqrt{1-\frac{4\cdot\pi^2\cdot c^2\cdot m_p^2\cdot r_p^2}{h^2\cdot\left(l_p^v\right)^4}}}{\pi^2\cdot h\cdot r_p} \qquad 98$$

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:

$$F_p^i=\frac{24\cdot\pi^2\cdot c^4\cdot m_p^3\cdot r_p}{h^2\cdot\left(l_p^v\right)^4} \qquad 99$$

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

$$F_n^i=\frac{4\cdot c^2\cdot m_n}{r_n} \qquad 100$$

where r_n is the orbit radius of negatrons and m_n is the inertial mass of negatron.

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

$$F_{pn}^{e}=\frac{16\cdot k_e\cdot q^2\cdot r_n\cdot r_p}{\left(r_n^2-r_p^2\right)^2} \qquad 101$$

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

$$F_{nn}^{e}=\frac{5\cdot k_e\cdot q^2}{2\cdot r_n^2} \qquad 102$$

The Helium family - Stability and Gyromagnetic ratios

If the following condition is completed is given to the dynamic equilibrium of helium 6 nucleus. The electric interaction between protons resultant plus the spin magnetic interaction between protons resultant, minus the inertial negatronic resultant, minus the electric interaction between negatrons resultant and minus the inertial protonic resultant, it should be necessarily equal to zero. Is enunciated this condition for the protons in the next expression.

$$F_{pp}^{e}+F_{pp}^{m}-F_{n}^{i}-F_{nn}^{e}-F_{p}^{i}=0 \quad \text{then} \quad \mathbf{103}$$

$$\frac{k_e\cdot q^2}{r_p^2}\left(\frac{3(A-2)}{\left(2\cdot Sin\left[\frac{\pi\left(1+\sqrt{5}\right)}{A}\right]\right)^2}+\frac{A^2-7A+12}{2\cdot\left(1+\frac{2}{A}\right)^2}\right)+\frac{6\cdot\mu_0\cdot m_p\cdot q^2\cdot c^3\cdot\left(l_p^v\right)^2\cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right]\cdot\sqrt{1-\frac{4\cdot\pi^2\cdot c^2\cdot m_p^2\cdot r_p^2}{h^2\cdot\left(l_p^v\right)^4}}}{\pi^2\cdot h\cdot r_p}=$$

$$=\frac{4\cdot c^2\cdot m_n}{r_n}+\frac{5\cdot k_e\cdot q^2}{2\cdot r_n^2}+\frac{24\cdot\pi^2\cdot c^4\cdot m_p^3\cdot r_p}{h^2\cdot\left(l_p^v\right)^4}$$

Another condition that should be satisfied, it's the negatronic dynamic equilibrium. The inertial negatronic resultant plus the electric interaction between negatrons resultant and minus the electric interaction between protons and negatrons resultant, it should be necessarily equal to zero. Is enunciated this condition in the following expression.

$$F_{n}^{i}+F_{nn}^{e}-F_{pn}^{e}=0 \quad \text{then} \quad \frac{4\cdot c^2\cdot m_n}{r_n}+\frac{5\cdot k_e\cdot q^2}{2\cdot r_n^2}=\frac{16\cdot k_e\cdot q^2\cdot r_n\cdot r_p}{\left(r_n^2-r_p^2\right)^2} \quad \mathbf{104}$$

Then, if we solve this system of equations **103** and **104**, we can know the orbit radius of protons and quantum state; the results will be following

$$r_p=\frac{h\cdot k_{^6He-p}}{2\cdot\pi\cdot c\cdot m_p}\cdot\sqrt[3]{\frac{m_p\cdot A}{m_n(A-Z)}}=\frac{3.6478685551311189264615318179\times10^{-15}}{\left(3.7792945783550842826899941412\times10^{-15}\right)} \text{ meter} \quad \text{then} \quad \mathbf{105}$$

$$Q_p^v=k_{^6He-p}\cdot\sqrt[3]{\frac{m_p\cdot A}{m_n(A-Z)}}=\frac{17.316023608105396647260931786}{(17.970206656028462788299293606)} \quad \text{and} \quad l_p^v=\frac{18.}{(18.)} \quad \mathbf{106}$$

where r_p is the orbit radius of protons, 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 closely whereby the value has been calculated), $k_{^6He-p}$ is a calculation constant for the protons of helium 6 with the magnitude 1.7470936268718677553124507539 inside calculations of **NIST** and the magnitude 1.7820209753149367504221345370 for the calculations inside of **QEDa**, A is the masic number (quantity of protons) and $(A-Z)$ is the negatrons quantity. In addition, the negatrons results will be following:

$$r_n=\frac{h\cdot k_{^6He-n}}{2\cdot\pi\cdot c\cdot m_n}\cdot\sqrt[3]{\frac{m_n(A-Z)}{m_p\cdot A}}=\frac{2.3498796274988401440399627419\times10^{-15}}{\left(2.3833876636184295426524393500\times10^{-15}\right)} \text{ meter} \quad \text{then} \quad \mathbf{107}$$

$$Q_n^r=\frac{1}{k_{^6He-n}\cdot\sqrt[3]{\frac{m_n(A-Z)}{m_p\cdot A}}}=\frac{54.835298176179072981994977453}{(64.015096254357956695457687601)} \quad \text{and} \quad l_n^r=\frac{54.}{(64.)} \quad \mathbf{108}$$

where r_n is the orbit radius of negatrons, Q_n^r is the quantum radial number calculated for negatrons and l_n^r is the quantum state of the negatrons (the smaller integer most closest whereby the value has been calculated). $k_{^6He-n}$ is a calculation constant for the negatrons of helium 6 with the magnitude 0.16067728663574790126666869127 inside calculations of **NIST** and the magnitude 0.17720466400527962180788676960 for the calculations inside of **QEDa**.

The magnitudes of the nuclear interactions according to the quantum state of the helium 6 nucleus and the orbit radius of the nuclear particles are:

- The electric interaction between protons resultant is:

$$F_{pp}^{e}=\frac{k_e\cdot q^2}{r_p^2}\left(\frac{3(A-2)}{\left(2\cdot Sin\left[\frac{\pi\left(1+\sqrt{5}\right)}{A}\right]\right)^2}+\frac{A^2-7A+12}{2\cdot\left(1+\frac{2}{A}\right)^2}\right)=$$

$$=\frac{82.07184172470442717894911766 05}{(76.462950465492710350190463941 5)}\ \text{Newton} \qquad \mathbf{109}$$

- The spin magnetic interaction between protons resultant is:

$$F_{pp}^{m}=\frac{6\cdot\mu_0\cdot m_p\cdot q^2\cdot c^3\cdot\left(l_p^v\right)^2\cdot Sin\left[\frac{\pi}{\left(l_p^v\right)^2}\right]\cdot\sqrt{1-\frac{4\cdot\pi^2\cdot c^2\cdot m_p^2\cdot r_p^2}{h^2\cdot\left(l_p^v\right)^4}}}{\pi^2\cdot h\cdot r_p}=$$

$$=\frac{1145.0788254053759374073706567 3}{(1107.0041967439906329673249274 5)}\ \text{Newton} \qquad \mathbf{110}$$

- The inertial protonic resultant is:

$$F_p^i=\frac{24\cdot\pi^2\cdot c^4\cdot m_p^3\cdot r_p}{h^2\cdot\left(l_p^v\right)^4}=\frac{705.0569278082739401725120842 46}{(734.1685286448642955292598344 39)}\ \text{Newton} \qquad \mathbf{111}$$

- The inertial negatronic resultant is:

$$F_n^i=\frac{4\cdot c^2\cdot m_n}{r_n}=\frac{417.6431454997697301223524846 14}{(347.7643203529904099013947416 10)}\ \text{Newton} \qquad \mathbf{112}$$

- The electric interaction between protons and negatrons resultant is:

$$F_{pn}^{e}=\frac{16\cdot k_e\cdot q^2\cdot r_n\cdot r_p}{\left(r_n^2-r_p^2\right)^2}=\frac{522.0937393218064244138076901 44}{(449.2986185646192325293668545 78)}\ \text{Newton} \qquad \mathbf{113}$$

- The electric interaction between negatrons resultant is:

$$F_{nn}^{e}=\frac{5\cdot k_e\cdot q^2}{2\cdot r_n^2}=\frac{104.4505938220365095503439079 04}{(101.5342982116287799954079673 63)}\ \text{Newton} \qquad \mathbf{114}$$

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

Resultant forces of the protonic layer: $\overbrace{F_{pp}^{e}+F_{pp}^{m}}^{\text{compression}}\rightarrow\frac{1227.15066713008\ \text{Newton}}{(1183.46714720948\ \text{Newton})}\leftarrow\overbrace{F_n^i+F_{nn}^{e}+F_p^i}^{\text{expansion}}$

and **115**

Resultant forces of the negatronic layer: $\overbrace{F_n^i+F_{nn}^{e}}^{\text{expansion}}\rightarrow\frac{522.093739321806\ \text{Newton}}{(449.298618564619\ \text{Newton})}\leftarrow\overbrace{F_{pn}^{e}}^{\text{compression}}$

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The calculations with high precision are:

1- Inside of **QEDa:**

$$\boldsymbol{r_p} = 3.647868555131118926461531817979937147288526000753217191989 10\times 10^{-15} \text{ meter} \quad \mathbf{116}$$

$$\boldsymbol{r_n} = 2.349879627498840144039962741905432091650796574881034790304 22\times 10^{-15} \text{ meter} \quad \mathbf{117}$$

$$\boldsymbol{k_{^6He-p}} = 1.782020975314936750422134537075180560350418090820312500000 00 \text{ dimensionless} \quad \mathbf{118}$$

$$\boldsymbol{k_{^6He-n}} = 0.177204664005279621807886769602191634476184844970703125000 00 \text{ dimensionless} \quad \mathbf{119}$$

2- Inside of **NIST:**

$$\boldsymbol{r_p} = 3.779294578355084282689994141284082965498443064188963122200 07\times 10^{-15} \text{ meter} \quad \mathbf{120}$$

$$\boldsymbol{r_n} = 2.383387663618429542652439350015689151177361982689446249646 24\times 10^{-15} \text{ meter} \quad \mathbf{121}$$

$$\boldsymbol{k_{^6He-p}} = 1.747093626871867755312450753990560770034790039062500000000 00 \text{ dimensionless} \quad \mathbf{122}$$

$$\boldsymbol{k_{^6He-n}} = 0.160677286635747901266668691278027836233377456665039062500 00 \text{ dimensionless} \quad \mathbf{123}$$

GYROMAGNETIC RATIOS of HELIUM 3

El Chalten - Santa Cruz - Argentina Credit: **Christian Martinez** Buenos Aires, Argentine (STOCKXPERT 623792)

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Initial note on gyromagnetic ratios of helium 3

This publication correct and update the magnitudes given to helium 3 $^{3}\boldsymbol{He}$ 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 *"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 helium 3

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 helium 3 particles. Then, there is a concise of these summarized magnitudes.

Is established the quantum state of the electrons in normal (letter "***N***" as right subindex in the variable) helium 3 by following relationship

$$\boldsymbol{Q}_{eN}^{v}=\frac{2\cdot\pi\cdot\boldsymbol{c}\cdot\boldsymbol{m}_{e}\cdot\boldsymbol{r}_{eN}}{\boldsymbol{h}}=\frac{174.0270864454915624719433253 63}{(174.02708644549156247194332 5363)}\quad\therefore\quad\boldsymbol{l}_{eN}^{v}=\frac{175.}{(175.)}\qquad 124$$

where $\boldsymbol{Q}_{eN}^{v}$ is the quantum vectorial number calculated for electrons, $\boldsymbol{c}$ is the speed of the light, $\boldsymbol{m}_{e}$ is the inertial mass of electron, $\boldsymbol{r}_{eN}$ is the orbit radius of electrons (according to expression number **5** and **6**), $\boldsymbol{h}$ is the constant of Planck and $\boldsymbol{l}_{eN}^{v}$ is the quantum state of the electrons (the bigger integer most closely whereby the value has been calculated).

Is established the quantum state of the electrons in ionized (letter "***I***" as right subindex in the variable) helium 3 by following relationship

$$\boldsymbol{Q}_{eI}^{v}=\frac{2\cdot\pi\cdot\boldsymbol{c}\cdot\boldsymbol{m}_{e}\cdot\boldsymbol{r}_{eI}}{\boldsymbol{h}}=\frac{67.8282051505025407323046238162}{(67.8282051505025407323046238162)}\quad\therefore\quad\boldsymbol{l}_{eI}^{v}=\frac{68.}{(68.)}\qquad 125$$

where $\boldsymbol{Q}_{eI}^{v}$ is the quantum vectorial number calculated for electron, $\boldsymbol{r}_{eI}$ is the orbit radius of electron (according to expression number **12** and **13**) and $\boldsymbol{l}_{eI}^{v}$ 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 in helium 3 by following relationship

$$\boldsymbol{Q}_{p}^{v}=\frac{2\cdot\pi\cdot\boldsymbol{c}\cdot\boldsymbol{m}_{p}\cdot\boldsymbol{r}_{p}}{\boldsymbol{h}}=\frac{19.1709924023083679855972150108}{(19.6427706295181891960055509117)}\quad\therefore\quad\boldsymbol{l}_{p}^{v}=\frac{20.}{(20.)}\qquad 126$$

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 **25** and **26**) 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 in helium 3 by following relationship

$$\boldsymbol{Q}_{n}^{r}=\frac{\boldsymbol{h}}{2\cdot\pi\cdot\boldsymbol{c}\cdot\boldsymbol{m}_{n}\cdot\boldsymbol{r}_{n}}=\frac{55.9161416449216872592842264567}{(67.2495267709597044358815765008)}\quad\therefore\quad\boldsymbol{l}_{n}^{r}=\frac{55.}{(67.)}\qquad 127$$

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 **27** and **28**)

The Helium family - Stability and Gyromagnetic ratios

and l_n^r is the quantum state of the negatrons (the smallest integer most closely whereby the value has been calculated).

Is given the radius of orbits to (according to expression number **124**, **125**, **126** and **127**)

electrons (normal) $$r_{eN} = \frac{h \cdot Q_{eN}^v}{2 \cdot \pi \cdot c \cdot m_e} = \frac{6.72734855086641383057448539174 \times 10^{-11}}{(6.72021718124220342261284778486 \times 10^{-11})} \text{ meter}$$ 128

electrons (ionized) $$r_{eI} = \frac{h \cdot Q_{eI}^v}{2 \cdot \pi \cdot c \cdot m_e} = \frac{2.62202848388216708327694153221 \times 10^{-11}}{(2.61924898551927037597275612172 \times 10^{-11})} \text{ meter}$$ 129

proton $$r_p = \frac{h \cdot Q_p^v}{2 \cdot \pi \cdot c \cdot m_p} = \frac{4.03864431798900315829743969631 \times 10^{-15}}{(4.13104968490202108451913732595 \times 10^{-15})} \text{ meter}$$ 130

negatron $$r_n = \frac{h}{2 \cdot \pi \cdot c \cdot m_n \cdot Q_n^r} = \frac{2.30445710775772494476691623187 \times 10^{-15}}{(2.26875634705385626502406209475 \times 10^{-15})} \text{ meter}$$ 131

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

electrons (normal) $$r_{seN} = \frac{h}{2 \cdot \pi \cdot c \cdot m_e} \sqrt{1 - \frac{(Q_{eN}^v)^2}{(l_{eN}^v)^4}} = \frac{3.86562808754964695726858698706 \times 10^{-13}}{(3.86153030333145070890139618987 \times 10^{-13})} \text{ meter}$$ 132

electrons (ionized) $$r_{seI} = \frac{h}{2 \cdot \pi \cdot c \cdot m_e} \sqrt{1 - \frac{(Q_{eI}^v)^2}{(l_{eI}^v)^4}} = \frac{3.86527458573324325699659233331 \times 10^{-13}}{(3.86117717624694861817004497046 \times 10^{-13})} \text{ meter}$$ 133

proton $$r_{sp} = \frac{h}{2 \cdot \pi \cdot c \cdot m_p} \sqrt{1 - \frac{(Q_P^v)^2}{(l_P^v)^4}} = \frac{2.10422240845382312295093979160 \times 10^{-16}}{(2.10055178223098562129705843607 \times 10^{-16})} \text{ meter}$$ 134

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

$$= \frac{4.29749777216828933463469599746 \times 10^{-22}}{(5.08871779455476118701962314648 \times 10^{-22})} \text{ meter}$$ 135

Is given the orbit medium tangential speed to

electrons (normal) $$v_{eN} = c \cdot \frac{Q_{eN}^v}{(l_{eN}^v)^2} = \frac{1.70357577156154741533100605011 \times 10^6}{(1.70357577156154741533100605011 \times 10^6)} \text{ m.s}^{-1}$$ 136

electrons (ionized) $$v_{eI} = c \cdot \frac{Q_{eI}^v}{(l_{eI}^v)^2} = \frac{4.39757446881431993097066879272 \times 10^6}{(4.39757446881431993097066879272 \times 10^6)} \text{ m.s}^{-1}$$ 137

proton $$v_p = c \cdot \frac{Q_p^v}{(l_p^v)^2} = \frac{1.43682973364683762192726135254 \times 10^7}{(1.47218862223836630582809448242 \times 10^7)} \text{ m.s}^{-1}$$ 138

negatron $$v_n = c = 299,792,458. \text{ m.s}^{-1}$$ 139

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

electrons (normal) $$v_{seN} = c \cdot \sqrt{1 - \frac{(Q_{eN}^v)^2}{(l_{eN}^v)^4}} = \frac{2.99787617661691129207611083984 \times 10^8}{(2.99787617661691129207611083984 \times 10^8)} \text{ m.s}^{-1}$$ 140

electrons (ionized) $$v_{seI} = c \cdot \sqrt{1 - \frac{(Q_{eI}^v)^2}{(l_{eI}^v)^4}} = \frac{2.99760202849666178226470947266 \times 10^8}{(2.99760202849666178226470947266 \times 10^8)} \text{ m.s}^{-1}$$ 141

proton $$v_{sp} = c \cdot \sqrt{1 - \frac{(Q_P^v)^2}{(l_P^v)^4}} = \frac{2.99447941895302712917327880859 \times 10^8}{(2.99430766521640121936798095703 \times 10^8)} \text{ m.s}^{-1}$$ 142

negatron $$v_{sn} = c \cdot \sqrt{1 - \frac{1}{(Q_n^r)^2}} = \frac{2.99744512147572934627532958984 \times 10^8}{(2.99759311608812868595123291016 \times 10^8)} \text{ m.s}^{-1}$$ 143

The orbital angular momentum of helium 3

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 electrons in normal helium 3 φ_{oeN} by

$$\varphi_{oeN} = 2 \cdot \boldsymbol{m}_e \cdot \boldsymbol{v}_{eN} \cdot \boldsymbol{r}_{eN} = \frac{2.0857569638674184625580502222 5\times 10^{-34}}{(2.08575696386741889020040383700 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 144$$

Is given the orbital angular momentum of the solitary electron in ionized helium 3 φ_{oeI} by

$$\varphi_{oeI} = \boldsymbol{m}_e \cdot \boldsymbol{v}_{eI} \cdot \boldsymbol{r}_{eI} = \frac{1.04924988442328128662879984714 \times 10^{-34}}{(1.04924988442328171427115346189 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 145$$

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

$$\varphi_{op1} = \boldsymbol{m}_p \cdot \boldsymbol{v}_p \cdot \boldsymbol{r}_p = \frac{9.68958784120475782070875841456 \times 10^{-35}}{(1.01723572671651644344238162577 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 146$$

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

$$\varphi_{op2} = 2 \cdot \boldsymbol{m}_p \cdot \boldsymbol{v}_p \cdot \boldsymbol{r}_p = \frac{1.93791756824095156414175168291 \times 10^{-34}}{(2.03447145343303288688476325154 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 147$$

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

$$\varphi_{on} = \boldsymbol{m}_n \cdot \boldsymbol{v}_n \cdot \boldsymbol{r}_n = \frac{1.88598793003492467742153233476 \times 10^{-36}}{(1.56814736549172193477099668355 \times 10^{-36})} \text{ kg.m}^2.\text{s}^{-1} \qquad 148$$

The spin angular momentum of helium 3

Is given the spin angular momentum of electrons in normal helium 3 φ_{seN} by

$$\varphi_{seN} = 2 \cdot \boldsymbol{m}_e \cdot \boldsymbol{v}_{seN} \cdot \boldsymbol{r}_{seN} = \frac{2.10907525837906927865533097886 \times 10^{-34}}{(2.10907525837906970629768459361 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 149$$

Is given the spin angular momentum of the solitary electron in ionized helium 3 φ_{seI} by

$$\varphi_{seI} = \boldsymbol{m}_e \cdot \boldsymbol{v}_{seI} \cdot \boldsymbol{r}_{seI} = \frac{1.05434476846211436321716411938 \times 10^{-34}}{(1.05434476846211457703834092676 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 150$$

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

$$\varphi_{sp1} = \boldsymbol{m}_p \cdot \boldsymbol{v}_{sp} \cdot \boldsymbol{r}_{sp} = \frac{1.05214928540415362605156213358 \times 10^{-34}}{(1.05202859304766364146522767115 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 151$$

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

$$\varphi_{sp2} = 2 \cdot \boldsymbol{m}_p \cdot \boldsymbol{v}_{sp} \cdot \boldsymbol{r}_{sp} = \frac{2.10429857080830725210312426715 \times 10^{-34}}{(2.10405718609532728293045534231 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 152$$

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

$$\varphi_{sn} = \boldsymbol{m}_n \cdot \boldsymbol{v}_{sn} \cdot \boldsymbol{r}_{sn} = \frac{3.51654741669882442312305879710 \times 10^{-43}}{(3.51689467437899896981375095648 \times 10^{-43})} \text{ kg.m}^2.\text{s}^{-1} \qquad 153$$

The Helium family - Stability and Gyromagnetic ratios

The orbital magnetic dipole moment of helium 3

Regarding the calculation of magnetic dipole moments, see "*The Hydrogen family - Stability and gyromagnetic ratios*" in the section "*The magnetic dipole moment*" on page 25.

Is given the orbital magnetic dipole moment of electrons in normal helium 3 η_{oeN} by

$$\eta_{oeN} = \frac{-q \cdot h}{2 \cdot \pi \cdot m_e} \cdot \left(\frac{Q_{eN}^v}{l_{eN}^v} \right)^2 = \frac{-1.8361821023503453482585815410 9 \times 10^{-23}}{(-1.834235645559796486628431479 79 \times 10^{-23})} \text{ A.m}^2 \qquad 154$$

Is given the orbital magnetic dipole moment of the solitary electron in ionized helium 3 η_{oeI} by

$$\eta_{oeI} = \frac{-q \cdot h}{4 \cdot \pi \cdot m_e} \cdot \left(\frac{Q_{eI}^v}{l_{eI}^v} \right)^2 = \frac{-9.2370007246619128233632307152 1 \times 10^{-24}}{(-9.2272089819138448630065496069 7 \times 10^{-24})} \text{ A.m}^2 \qquad 155$$

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

$$\eta_{op1} = \frac{q \cdot h}{4 \cdot \pi \cdot m_p} \cdot \left(\frac{Q_p^v}{l_p^v} \right)^2 = \frac{4.6485904240548913671990171650 6 \times 10^{-27}}{(4.8719659594239533321067355546 6 \times 10^{-27})} \text{ A.m}^2 \qquad 156$$

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

$$\eta_{op2} = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(\frac{Q_p^v}{l_p^v} \right)^2 = \frac{9.2971808481097827343980343301 3 \times 10^{-27}}{(9.7439319188479066642134711093 3 \times 10^{-27})} \text{ A.m}^2 \qquad 157$$

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

$$\eta_{on} = \frac{-q \cdot h}{4 \cdot \pi \cdot m_n} \cdot \frac{1}{(Q_n^r)^2} = \frac{-5.5343892607023647400540363727 7 \times 10^{-26}}{(-5.4486502352402478355534049589 8 \times 10^{-26})} \text{ A.m}^2 \qquad 158$$

The spin magnetic dipole moment of helium 3

Is given the spin magnetic dipole moment of electrons in normal helium 3 η_{seN} by

$$\eta_{seN} = \frac{-q \cdot h}{2 \cdot \pi \cdot m_e} \cdot \left(1 - \frac{(Q_{eN}^v)^2}{(l_{eN}^v)^4} \right) = \frac{-1.8567102059507933944332293578 3 \times 10^{-23}}{(-1.8547419882103919051054124197 9 \times 10^{-23})} \text{ A.m}^2 \qquad 159$$

Is given the spin magnetic dipole moment of the solitary electron in ionized helium 3 η_{seI} by

$$\eta_{seI} = \frac{-q \cdot h}{4 \cdot \pi \cdot m_e} \cdot \left(1 - \frac{(Q_{eI}^v)^2}{(l_{eI}^v)^4} \right) = \frac{-9.2818531933230206882024570888 1 \times 10^{-24}}{(-9.2720139044235729266356107472 0 \times 10^{-24})} \text{ A.m}^2 \qquad 160$$

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

$$\eta_{sp1} = \frac{q \cdot h}{4 \cdot \pi \cdot m_p} \cdot \left(1 - \frac{(Q_p^v)^2}{(l_p^v)^4} \right) = \frac{5.0476977689464057142902844985 7 \times 10^{-27}}{(5.0386035006979777242108809373 8 \times 10^{-27})} \text{ A.m}^2 \qquad 161$$

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

$$\eta_{sp2} = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(1 - \frac{(Q_p^v)^2}{(l_p^v)^4} \right) = \frac{1.0095395553789281142858056899 71 \times 10^{-26}}{(1.0077207001395955448421761874 8 \times 10^{-26})} \text{ A.m}^2 \qquad 162$$

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

$$\eta_{sn} = \frac{-q \cdot h}{4 \cdot \pi \cdot m_n \cdot (299{,}792{,}458.)} \cdot \left(1 - \frac{1}{(Q_n^r)^2} \right) = \frac{-1.0319229485932191842965090868 0 \times 10^{-32}}{(-1.2219724635931522708465361041 0 \times 10^{-32})} \text{ A.m}^2 \qquad 163$$

Orbital: Gyromagnetic ratios and Landé factors of helium 3

Note important: *In all the following expressions starting from here where the square root of the square of the sum of vectors is calculated, it should be take the absolute value of the same expression, because the sign has already considered in the operation.*

Is given the gyromagnetic ratio γ_{OeN} and Landé factor g_{OeN} of the electronic orbital in normal helium 3 by

the resultant of the angular momentum is

$$\varphi_{OeN} = \sqrt{(\varphi_{oeN})^2 + (\varphi_{seN})^2} = \frac{2.96624013826058409139959872205\times10^{-34}}{(2.96624013826058451904195233680\times10^{-34})}\ \mathrm{kg.m^2.s^{-1}} \tag{164}$$

the resultant of the magnetic moment is

$$\eta_{OeN} = \sqrt{(\eta_{oeN})^2 + (\eta_{seN})^2} = \frac{2.61130953773649207167467490974\times10^{-23}}{(2.60854140206223319049159922395\times10^{-23})}\ \mathrm{A.m^2} \tag{165}$$

then

$$\gamma_{OeN} = \frac{\eta_{OeN}}{\varphi_{OeN}} = \frac{q}{2\cdot m_e} = \frac{8.80343268251967926025390625000\times10^{10}}{(8.79410054639707183837890625000\times10^{10})}\ \mathrm{Hz.T^{-1}} \tag{166}$$

$$g_{OeN} = 2\cdot\frac{2\cdot m_e}{q}\cdot\gamma_{OeN} = 2\cdot\frac{2\cdot m_e}{q}\cdot\frac{q}{2\cdot m_e} = 2. \tag{167}$$

Is given the gyromagnetic ratio γ_{OeI} and Landé factor g_{OeI} of the electronic orbital in ionized helium 3 by

the resultant of the angular momentum is

$$\varphi_{OeI} = \sqrt{(\varphi_{oeI})^2 + (\varphi_{seI})^2} = \frac{1.48747040667896940178952887123\times10^{-34}}{(1.48747040667896982943188248598\times10^{-34})}\ \mathrm{kg.m^2.s^{-1}} \tag{168}$$

the resultant of the magnetic moment is

$$\eta_{OeI} = \sqrt{(\eta_{oeI})^2 + (\eta_{seI})^2} = \frac{1.30948455924384780515178522809\times10^{-23}}{(1.30809643161249996189594203957\times10^{-23})}\ \mathrm{A.m^2} \tag{169}$$

then

$$\gamma_{OeI} = \frac{\eta_{OeI}}{\varphi_{OeI}} = \frac{q}{2\cdot m_e} = \frac{8.80343268251967926025390625000\times10^{10}}{(8.79410054639707031250000000000\times10^{10})}\ \mathrm{Hz.T^{-1}} \tag{170}$$

$$g_{OeI} = 2\cdot\frac{m_e}{q}\cdot\gamma_{OeI} = 2\cdot\frac{m_e}{q}\cdot\frac{q}{2\cdot m_e} = 1. \tag{171}$$

Is given the gyromagnetic ratio γ_{O1p} and Landé factor g_{O1p} of the protonic orbital one by

the resultant of the angular momentum is

$$\varphi_{O1p} = \sqrt{(\varphi_{op1})^2 + (\varphi_{sp1})^2} = \frac{1.43034934337758958714435648838\times10^{-34}}{(1.46339765077655020571531707786\times10^{-34})}\ \mathrm{kg.m^2.s^{-1}} \tag{172}$$

the resultant of the magnetic moment is

$$\eta_{O1p} = \sqrt{(\eta_{op1})^2 + (\eta_{sp1})^2} = \frac{6.86211670676339961451150371750\times10^{-27}}{(7.00882140926929778041180976136\times10^{-27})}\ \mathrm{A.m^2} \tag{173}$$

then

$$\gamma_{O1p} = \frac{\eta_{O1p}}{\varphi_{O1p}} = \frac{q}{2\cdot m_p} = \frac{4.79751099864832758903503417969\times10^{7}}{(4.78941687896661236882209777832\times10^{7})}\ \mathrm{Hz.T^{-1}} \tag{174}$$

$$g_{O1p} = 2\cdot\frac{m_p}{q}\cdot\gamma_{O1p} = 2\cdot\frac{m_p}{q}\cdot\frac{q}{2\cdot m_p} = 1. \tag{175}$$

The Helium family - Stability and Gyromagnetic ratios

Is given the gyromagnetic ratio γ_{O2p} and Landé factor g_{O2p} of the protonic orbital two by

the resultant of the angular momentum is

$$\varphi_{O2p} = \sqrt{(\varphi_{op2})^2 + (\varphi_{sp2})^2} = \frac{2.860698686755179174288712976 76\times 10^{-34}}{(2.9267953015531004114306341557 1\times 10^{-34})}\ \text{kg.m}^2.\text{s}^{-1} \quad 176$$

the resultant of the magnetic moment is

$$\eta_{O2p} = \sqrt{(\eta_{op2})^2 + (\eta_{sp2})^2} = \frac{1.372423341352679922902300743 50\times 10^{-26}}{(1.4017642818538595560823619522 7\times 10^{-26})}\ \text{A.m}^2 \quad 177$$

then

$$\gamma_{O2p} = \frac{\eta_{O2p}}{\varphi_{O2p}} = \frac{q}{2\cdot m_p} = \frac{4.797510998648327589035034179 69\times 10^{7}}{(4.789416878966612368822097778 32\times 10^{7})}\ \text{Hz.T}^{-1} \quad 178$$

$$g_{O2p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\gamma_{O2p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\frac{q}{2\cdot m_p} = 2. \quad 179$$

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

the resultant of the angular momentum is

$$\varphi_{Op} = \sqrt{(\varphi_{op1} + \varphi_{sp2})^2 + (\varphi_{sp1} - \varphi_{op2})^2} =$$

$$= \frac{3.198358363364479084125399775 59\times 10^{-34}}{(3.272256625249863718485509006 06\times 10^{-34})}\ \text{kg.m}^2.\text{s}^{-1} \quad 180$$

the resultant of the magnetic moment is

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

$$= \frac{1.534415942585995165636640665 07\times 10^{-26}}{(1.567220111328202474763286207 12\times 10^{-26})}\ \text{A.m}^2 \quad 181$$

then

$$\gamma_{Op} = \frac{\eta_{Op}}{\varphi_{Op}} = \frac{q}{2\cdot m_p} = \frac{4.797510998648327589035034179 69\times 10^{7}}{(4.789416878966613111388015747 070\times 10^{7})}\ \text{Hz.T}^{-1} \quad 182$$

$$g_{Op} = 2\cdot\frac{3\cdot m_p}{q}\cdot\gamma_{Op} = 2\cdot\frac{3\cdot m_p}{q}\cdot\frac{q}{2\cdot m_p} = 3. \quad 183$$

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

the resultant of the angular momentum is

$$\varphi_{On} = \sqrt{(\varphi_{on})^2 + (\varphi_{sn})^2} = \frac{1.885987930034957418789230964 15\times 10^{-36}}{(1.568147365491761358050470543 43\times 10^{-36})}\ \text{kg.m}^2.\text{s}^{-1} \quad 184$$

the resultant of the magnetic moment is

$$\eta_{On} = \sqrt{(\eta_{on})^2 + (\eta_{sn})^2} = \frac{5.534389260702461167325002263 54\times 10^{-26}}{(5.448650235240384440853939970 91\times 10^{-26})}\ \text{A.m}^2 \quad 185$$

then

$$\gamma_{On} = \frac{\eta_{On}}{\varphi_{On}} = \frac{q}{2\cdot m_n} = \frac{2.934477560839893341064453125 00\times 10^{10}}{(3.474577935174938964843750000 00\times 10^{10})}\ \text{Hz.T}^{-1} \quad 186$$

$$g_{On} = 2\cdot\frac{m_n}{q}\cdot\gamma_{On} = 2\cdot\frac{m_n}{q}\cdot\frac{q}{2\cdot m_n} = 1. \quad 187$$

Nucleus: Gyromagnetic ratios and Landé factors of helium 3

Is given the gyromagnetic ratio γ_N and Landé factor g_N of nucleus by

the resultant of the angular momentum is

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

$$=\frac{h}{2\cdot\pi}\cdot\sqrt{\left(1+\frac{1}{Q_n^r}-\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}-2\cdot\left(\frac{Q_p^v}{l_p^v}\right)^2\right)^2+\left(2-\frac{1}{c}+\frac{1}{c\cdot\left(Q_n^r\right)^2}-\frac{2\cdot\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}+\left(\frac{Q_p^v}{l_p^v}\right)^2\right)^2}=$$

$$=\frac{3.1931866416060723830195249757 4\times10^{-34}}{\left(3.2675827463872919074591731741 0\times10^{-34}\right)}\ \mathrm{kg.m^2.s^{-1}} \qquad 188$$

the resultant of the magnetic moment is

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

$$=\frac{q\cdot h}{4\cdot\pi}\cdot\sqrt{\begin{array}{r}\left(\frac{1}{c\cdot m_n}\cdot\left(1-\frac{1}{\left(Q_n^r\right)^2}\right)+\frac{1}{m_p}\cdot\left(\frac{Q_p^v}{l_p^v}\right)^2+\frac{2}{m_p}\cdot\left(1-\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right)\right)^2+\\+\left(\frac{1}{m_n\cdot Q_n^r}+\frac{1}{m_p}\cdot\left(-1+\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}+2\cdot\left(\frac{Q_p^v}{l_p^v}\right)^2\right)\right)^2\end{array}}=$$

$$=\frac{6.1390193451514653850863294132 2\times10^{-26}}{\left(6.1050396948192968209678175066 4\times10^{-26}\right)}\ \mathrm{A.m^2} \qquad 189$$

then

$$\gamma_N=\frac{\eta_N}{\varphi_N}=\frac{1.9225369620310488343238830566 4\times10^{8}}{\left(1.8683657518907997012138366699 2\times10^{8}\right)}\ \mathrm{Hz.T^{-1}} \qquad 190$$

$$g_N=2\cdot\frac{3\cdot m_p+m_n}{q}\cdot\gamma_N=\frac{12.028641518317586545094854955 1}{\left(11.708466362973950936066103167 8\right)} \qquad 191$$

Atom: Gyromagnetic ratios and Landé factors of normal helium 3

Is given the gyromagnetic ratio γ_{TN} and Landé factor g_{TN} of normal helium 3 atom by

the resultant of the angular momentum is

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

$$=\frac{h}{2\cdot\pi}\cdot\sqrt{\begin{array}{r}\left(1+\frac{1}{Q_n^r}-\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}-2\cdot\left(\frac{Q_p^v}{l_p^v}\right)^2+2\cdot\left(\frac{Q_{eN}^v}{l_{eN}^r}\right)^2\right)^2+\\+\left(-\frac{1}{c}+\frac{1}{c\cdot\left(Q_n^r\right)^2}-\frac{2\cdot\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}+\left(\frac{Q_p^v}{l_p^v}\right)^2+\frac{2\cdot\left(Q_{eN}^v\right)^2}{\left(l_{eN}^v\right)^4}\right)^2\end{array}}=$$

$$=\frac{1.5541038966384127614293130170 1\times10^{-34}}{\left(1.5088855736860085863399266499 4\times10^{-34}\right)}\ \mathrm{kg.m^2.s^{-1}} \qquad 192$$

the resultant of the magnetic moment is

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

$$= \frac{q\cdot h}{4\cdot\pi}\cdot\sqrt{\begin{array}{l}\left(\frac{1}{c\cdot m_n}+\frac{1}{m_p}\cdot\left(-1+\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}+2\cdot\left(\frac{Q_p^v}{l_p^v}\right)^2\right)+\frac{2}{m_e}\cdot\left(\frac{Q_{eN}^v}{l_{eN}^v}\right)^2\right)^2+\\ +\left(\frac{\left(Q_n^r\right)^2-1}{c\cdot m_n\cdot\left(Q_n^r\right)^2}+\frac{2\cdot\left(l_p^v\right)^4-2\cdot\left(Q_p^v\right)^2+\left(l_p^v\right)^2\cdot\left(Q_p^v\right)^2}{m_p\cdot\left(l_p^v\right)^4}+\frac{2}{m_e}\cdot\left(1-\frac{\left(Q_{eN}^v\right)^2}{\left(l_{eN}^v\right)^4}\right)\right)^2\end{array}} =$$

$$= \frac{2.616550231330781773109842703 44\times10^{-23}}{\left(2.613768399697324739224430405 30\times10^{-23}\right)}\ \text{A.m}^2 \quad 193$$

then

$$\gamma_{TN} = \frac{\eta_{TN}}{\varphi_{TN}} = \frac{1.683639193615357360839843750 00\times10^{11}}{\left(1.732250904428911132812500000 00\times10^{11}\right)}\ \text{Hz.T}^{-1} \quad 194$$

$$g_{TN} = 2\cdot\frac{3\cdot m_p+m_n+2\cdot m_e}{q}\cdot\gamma_{TN} = \frac{10537.766677356406944454647600 7}{\left(10859.416574666774977231398224 8\right)} \quad 195$$

Atom: Gyromagnetic ratios and Landé factors of ionized helium 3

Is given the gyromagnetic ratio γ_{TI} and Landé factor g_{TI} of ionized helium 3 atom by

the resultant of the angular momentum is

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

$$= \frac{h}{2\cdot\pi}\cdot\sqrt{\begin{array}{l}\left(1+\frac{1}{Q_n^r}-\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}-2\cdot\left(\frac{Q_p^v}{l_p^v}\right)^2+\left(\frac{Q_{eI}^v}{l_{eI}^v}\right)^2\right)^2+\\ +\left(1-\frac{1}{c}+\frac{1}{c\cdot\left(Q_n^r\right)^2}-\frac{2\cdot\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}+\left(\frac{Q_p^v}{l_p^v}\right)^2+\frac{\left(Q_{eI}^v\right)^2}{\left(l_{eI}^v\right)^4}\right)^2\end{array}} =$$

$$= \frac{2.027130097760460880053425882 62\times10^{-34}}{\left(2.068593476046933266075408139 40\times10^{-34}\right)}\ \text{kg.m}^2.\text{s}^{-1} \quad 196$$

the resultant of the magnetic moment is

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

$$= \frac{q\cdot h}{4\cdot\pi}\cdot\sqrt{\begin{array}{l}\left(\frac{1}{c\cdot m_n}\cdot\left(1-\frac{1}{\left(Q_n^r\right)^2}\right)+\frac{1}{m_p}\cdot\left(\frac{Q_p^v}{l_p^v}\right)^2+\frac{2}{m_p}\cdot\left(1-\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right)+\frac{1}{m_e}\cdot\left(1-\frac{\left(Q_{eI}^v\right)^2}{\left(l_{eI}^v\right)^4}\right)\right)^2+\\ +\left(\frac{1}{m_n\cdot Q_n^r}+\frac{1}{m_p}\cdot\left(-1+\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}+2\cdot\left(\frac{Q_p^v}{l_p^v}\right)^2\right)+\frac{1}{m_e}\cdot\left(\frac{Q_{eI}^v}{l_{eI}^v}\right)^2\right)^2\end{array}} =$$

$$= \frac{1.314737164502410112738420460 79\times10^{-23}}{\left(1.313335157077182155330700065 31\times10^{-23}\right)}\ \text{A.m}^2 \quad 197$$

then

$$\gamma_{TI} = \frac{\eta_{TI}}{\varphi_{TI}} = \frac{6.485706891505925750732421875 00\times10^{10}}{\left(6.348928256251469421386718750 00\times10^{10}\right)}\ \text{Hz.T}^{-1} \quad 198$$

$$g_{TI} = 2\cdot\frac{3\cdot m_p+m_n+m_e}{q}\cdot\gamma_{TI} = \frac{4058.616741200517026300076395 27}{\left(3979.397587367521737178321927 79\right)} \quad 199$$

Summary of helium 3

First part - Calculations performed according to NIST constants

Table 1: The orbital gyromagnetic ratios and Landé factor of helium 3.

Particle in orbit		**Gyromagnetic ratio** $Hz.T^{-1}$	**Landé factor**
Electrons	normal	$8.7941005463970718383789062500 0\times10^{10}$	2.
Electrons	ionized	$8.79410054639707031250000000000\times10^{10}$	1.
Protons	Orbital 1	$4.789416878966612368822097778 32\times10^{7}$	1.
Protons	Orbital 2	$4.78941687896661236882209777832\times10^{7}$	2.
Protons	Total	$4.78941687896661311388015747070\times10^{7}$	3.
Negatron		$3.47457793517493896484375000000\times10^{10}$	1.

Table 2: The nuclear gyromagnetic ratios and Landé factor of helium 3.

Variable	**Magnitude**	**Measure unit**
Gyromagnetic ratio	$1.86836575189079970121383666992\times10^{8}$	$Hz.T^{-1}$
Landé factor	11.7084663629739509360661031678	Dimensionless

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

Variable	**Magnitude**	**Measure unit**
Gyromagnetic ratio	$1.73225090442891113281250000000\times10^{11}$	$Hz.T^{-1}$
Landé factor	10859.4165746667749772313982248	Dimensionless

Table 4: The atomic gyromagnetic ratios and Landé factor of the ionized helium 3.

Variable	**Magnitude**	**Measure unit**
Gyromagnetic ratio	$6.34892825625146942138671875000\times10^{10}$	$Hz.T^{-1}$
Landé factor	3979.39758736752173717832192779	Dimensionless

The Helium family - Stability and Gyromagnetic ratios

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

Table 5: The orbital gyromagnetic ratios and Landé factor of helium 3.

Particle in orbit		Gyromagnetic ratio Hz.T^{-1}	Landé factor
Electrons	normal	$8.8034326825196792602539062500 \times 10^{10}$	2.
Electrons	ionized	$8.8034326825196792602539062500 \times 10^{10}$	1.
Protons	Orbital 1	$4.7975109986483275890350341796 9 \times 10^{7}$	1.
Protons	Orbital 2	$4.79751099864832758903503417969 \times 10^{7}$	2.
Protons	Total	$4.79751099864832758903503417969 \times 10^{7}$	3.
Negatron		$2.9344775608398933410644531250 0 \times 10^{10}$	1.

Table 6: The nuclear gyromagnetic ratios and Landé factor of helium 3.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$1.92253696203104883432388305664 \times 10^{8}$	Hz.T^{-1}
Landé factor	12.0286415183175865450948549551	Dimensionless

Table 7: The atomic gyromagnetic ratios and Landé factor of the normal helium 3.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$1.68363919361535736083984375000 \times 10^{11}$	Hz.T^{-1}
Landé factor	10537.7666773564069444546476007	Dimensionless

Table 8: The atomic gyromagnetic ratios and Landé factor of the ionized helium 3.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$6.48570689150592575073242187500 \times 10^{10}$	Hz.T^{-1}
Landé factor	4058.61674120051702630007639527	Dimensionless

GYROMAGNETIC RATIOS of HELIUM 4

Iguazu Falls - Misiones - Argentina Credit: **Roberto Sant** Buenos Aires, Argentina (STOCKXPERT 110600)

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Initial note on gyromagnetic ratios of helium 4

This publication correct and update the magnitudes given to helium 4 ^{4}He 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 *"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 helium 4

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 helium 4 particles. Then, there is a concise of these summarized magnitudes.

Is established the quantum state of the electrons in normal (letter "*N*" as right subindex in the variable) helium 4 by following relationship

$$Q^{v}_{eN} = \frac{2\cdot\pi\cdot c\cdot m_e\cdot r_{eN}}{h} = \frac{174.027086445491562471943325363}{(174.027086445491562471943325363)} \quad \therefore \quad l^{v}_{eN} = \frac{175.}{(175.)} \qquad 200$$

where Q^{v}_{eN} is the quantum vectorial number calculated for electrons, c is the speed of the light, m_e is the inertial mass of electron, r_{eN} is the orbit radius of electrons (according to expression number **5** and **6**), h is the constant of Planck and l^{v}_{eN} is the quantum state of the electrons (the bigger integer most closely whereby the value has been calculated).

Is established the quantum state of the electrons in ionized (letter "*I*" as right subindex in the variable) helium 4 by following relationship

$$Q^{v}_{eI} = \frac{2\cdot\pi\cdot c\cdot m_e\cdot r_{eI}}{h} = \frac{67.8282051505025407323046238162}{(67.8282051505025407323046238162)} \quad \therefore \quad l^{v}_{eI} = \frac{68.}{(68.)} \qquad 201$$

where Q^{v}_{eI} is the quantum vectorial number calculated for electron, r_{eI} is the orbit radius of electron (according to expression number **12** and **13**) and l^{v}_{eI} 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 in helium 4 by following relationship

$$Q^{v}_{p} = \frac{2\cdot\pi\cdot c\cdot m_p\cdot r_p}{h} = \frac{15.0098732105041587914229239686}{(15.3611555694118262493930160417)} \quad \therefore \quad l^{v}_{p} = \frac{16.}{(16.)} \qquad 202$$

where Q^{v}_{p} is the quantum vectorial number calculated for protons, m_p is the inertial mass of proton, r_p is the orbit radius of protons (according to expression number **51** and **52**) and l^{v}_{p} 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 in helium 4 by following relationship

$$Q^{r}_{n} = \frac{h}{2\cdot\pi\cdot c\cdot m_n\cdot r_n} = \frac{66.8150628158293500291620148346}{(79.7697710066495631053840043023)} \quad \therefore \quad l^{r}_{n} = \frac{66.}{(79.)} \qquad 203$$

where Q^{r}_{n} is the quantum radial number calculated for negatron, m_n is the inertial mass of negatron, r_n is the orbit radius of negatrons (according to expression number **53** and **54**)

The Helium family - Stability and Gyromagnetic ratios

and l_n^r is the quantum state of the negatrons (the smallest integer most closely whereby the value has been calculated).

Is given the radius of orbits to (according to expression number **200**, **201**, **202** and **203**)

electrons (normal) $$r_{eN} = \frac{h \cdot Q_{eN}^v}{2 \cdot \pi \cdot c \cdot m_e} = \frac{6.72734855086641383057448539174 \times 10^{-11}}{\left(6.72021718124220342261284778486 \times 10^{-11}\right)} \text{ meter} \quad \textbf{204}$$

electrons (ionized) $$r_{eI} = \frac{h \cdot Q_{eI}^v}{2 \cdot \pi \cdot c \cdot m_e} = \frac{2.62202848388216708327694153221 \times 10^{-11}}{\left(2.61924898551927037597275612172 \times 10^{-11}\right)} \text{ meter} \quad \textbf{205}$$

proton $$r_p = \frac{h \cdot Q_p^v}{2 \cdot \pi \cdot c \cdot m_p} = \frac{3.16204492095249088765133529737 \times 10^{-15}}{\left(3.23058788760626980461208645587 \times 10^{-15}\right)} \text{ meter} \quad \textbf{206}$$

negatron $$r_n = \frac{h}{2 \cdot \pi \cdot c \cdot m_n \cdot Q_n^r} = \frac{1.92855240452606092560976474607 \times 10^{-15}}{\left(1.91266426833875049275051307821 \times 10^{-15}\right)} \text{ meter} \quad \textbf{207}$$

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

electrons (normal) $$r_{seN} = \frac{h}{2 \cdot \pi \cdot c \cdot m_e} \sqrt{1 - \frac{\left(Q_{eN}^v\right)^2}{\left(l_{eN}^v\right)^4}} = \frac{3.86562808754964695726858698706 \times 10^{-13}}{\left(3.86153030333145070890139618987 \times 10^{-13}\right)} \text{ meter} \quad \textbf{208}$$

electrons (ionized) $$r_{seI} = \frac{h}{2 \cdot \pi \cdot c \cdot m_e} \sqrt{1 - \frac{\left(Q_{eI}^v\right)^2}{\left(l_{eI}^v\right)^4}} = \frac{3.86527458573324325699659233331 \times 10^{-13}}{\left(3.86117717624694861817004497046 \times 10^{-13}\right)} \text{ meter} \quad \textbf{209}$$

proton $$r_{sp} = \frac{h}{2 \cdot \pi \cdot c \cdot m_p} \sqrt{1 - \frac{\left(Q_P^v\right)^2}{\left(l_P^v\right)^4}} = \frac{2.10301915257556957924492268898 \times 10^{-16}}{\left(2.09929955807638999129407739049 \times 10^{-16}\right)} \text{ meter} \quad \textbf{210}$$

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

$$= \frac{4.29770375429334198322904923268 \times 10^{-22}}{\left(5.08888057395893780599150986746 \times 10^{-22}\right)} \text{ meter} \quad \textbf{211}$$

Is given the orbit medium tangential speed to

electrons (normal) $$v_{eN} = c \cdot \frac{Q_{eN}^v}{\left(l_{eN}^v\right)^2} = \frac{1.70357577156154741533100605011 \times 10^6}{\left(1.70357577156154741533100605011 \times 10^6\right)} \text{ m.s}^{-1} \quad \textbf{212}$$

electrons (ionized) $$v_{eI} = c \cdot \frac{Q_{eI}^v}{\left(l_{eI}^v\right)^2} = \frac{4.39757446881431993097066879272 \times 10^6}{\left(4.39757446881431993097066879272 \times 10^6\right)} \text{ m.s}^{-1} \quad \textbf{213}$$

proton $$v_p = c \cdot \frac{Q_p^v}{\left(l_p^v\right)^2} = \frac{1.75775265001773163676261901855 \times 10^7}{\left(1.79889007260717228055000305176 \times 10^7\right)} \text{ m.s}^{-1} \quad \textbf{214}$$

negatron $$v_n = c = 299{,}792{,}458. \text{ m.s}^{-1} \quad \textbf{215}$$

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

electrons (normal) $$v_{seN} = c \cdot \sqrt{1 - \frac{\left(Q_{eN}^v\right)^2}{\left(l_{eN}^v\right)^4}} = \frac{2.99787617661691129207611083984 \times 10^8}{\left(2.99787617661691129207611083984 \times 10^8\right)} \text{ m.s}^{-1} \quad \textbf{216}$$

electrons (ionized) $$v_{seI} = c \cdot \sqrt{1 - \frac{\left(Q_{eI}^v\right)^2}{\left(l_{eI}^v\right)^4}} = \frac{2.99760202849666178226470947266 \times 10^8}{\left(2.99760202849666178226470947266 \times 10^8\right)} \text{ m.s}^{-1} \quad \textbf{217}$$

proton $$v_{sp} = c \cdot \sqrt{1 - \frac{\left(Q_P^v\right)^2}{\left(l_P^v\right)^4}} = \frac{2.99276708809451699256896972656 \times 10^8}{\left(2.99252263691269874572753906250 \times 10^8\right)} \text{ m.s}^{-1} \quad \textbf{218}$$

negatron $$v_{sn} = c \cdot \sqrt{1 - \frac{1}{\left(Q_n^r\right)^2}} = \frac{2.99758879115249931812286376953 \times 10^8}{\left(2.99768900397995114326477050781 \times 10^8\right)} \text{ m.s}^{-1} \quad \textbf{219}$$

The orbital angular momentum of helium 4

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 electrons in normal helium 4 φ_{oeN} by

$$\varphi_{oeN} = 2 \cdot \boldsymbol{m}_e \cdot \boldsymbol{v}_{eN} \cdot \boldsymbol{r}_{eN} = \frac{2.0857569638674184625580502222\text{5} \times 10^{-34}}{(2.08575696386741889020040383700 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 220$$

Is given the orbital angular momentum of the solitary electron in ionized helium 4 φ_{oeI} by

$$\varphi_{oeI} = \boldsymbol{m}_e \cdot \boldsymbol{v}_{eI} \cdot \boldsymbol{r}_{eI} = \frac{1.04924988442328128662879984714 \times 10^{-34}}{(1.04924988442328171427115346189 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 221$$

Is given the orbital angular momentum of the complete protonic orbital one φ_{op1} by

$$\varphi_{op1} = 2 \cdot \boldsymbol{m}_p \cdot \boldsymbol{v}_p \cdot \boldsymbol{r}_p = \frac{1.85618040295548826535425722141 \times 10^{-34}}{(1.94407900732271542659817813824 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 222$$

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

$$\varphi_{op2} = 2 \cdot \boldsymbol{m}_p \cdot \boldsymbol{v}_p \cdot \boldsymbol{r}_p = \frac{1.85618040295548826535425722141 \times 10^{-34}}{(1.94407900732271542659817813824 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 223$$

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

$$\varphi_{on} = 2 \cdot \boldsymbol{m}_n \cdot \boldsymbol{v}_n \cdot \boldsymbol{r}_n = \frac{3.15668844096218760784273540699 \times 10^{-36}}{(2.64403838460698771475511591639 \times 10^{-36})} \text{ kg.m}^2.\text{s}^{-1} \quad 224$$

The spin angular momentum of helium 4

Is given the spin angular momentum of electrons in normal helium 4 φ_{seN} by

$$\varphi_{seN} = 2 \cdot \boldsymbol{m}_e \cdot \boldsymbol{v}_{seN} \cdot \boldsymbol{r}_{seN} = \frac{2.10907525837906927865533097886 \times 10^{-34}}{(2.10907525837906970629768459361 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 225$$

Is given the spin angular momentum of the solitary electron in ionized helium 4 φ_{seI} by

$$\varphi_{seI} = \boldsymbol{m}_e \cdot \boldsymbol{v}_{seI} \cdot \boldsymbol{r}_{seI} = \frac{1.05434476846211436321716411938 \times 10^{-34}}{(1.05434476846211457703834092676 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 226$$

Is given the spin angular momentum of the complete protonic orbital one φ_{sp1} by

$$\varphi_{sp1} = 2 \cdot \boldsymbol{m}_p \cdot \boldsymbol{v}_{sp} \cdot \boldsymbol{r}_{sp} = \frac{2.10189266002986528645620118092 \times 10^{-34}}{(2.10154930610655549464869456662 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 227$$

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

$$\varphi_{sp2} = 2 \cdot \boldsymbol{m}_p \cdot \boldsymbol{v}_{sp} \cdot \boldsymbol{r}_{sp} = \frac{2.10189266002986528645620118092 \times 10^{-34}}{(2.10154930610655549464869456662 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 228$$

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

$$\varphi_{sn} = 2 \cdot \boldsymbol{m}_n \cdot \boldsymbol{v}_{sn} \cdot \boldsymbol{r}_{sn} = \frac{7.03376905203123441336354663977 \times 10^{-43}}{(7.03423935380764462847532455480 \times 10^{-43})} \text{ kg.m}^2.\text{s}^{-1} \quad 229$$

The Helium family - Stability and Gyromagnetic ratios

The orbital magnetic dipole moment of helium 4

Regarding the calculation of magnetic dipole moments, see "*The Hydrogen family – Stability and gyromagnetic ratios*" in the section "*The magnetic dipole moment*" on page 25.

Is given the orbital magnetic dipole moment of electrons in normal helium 4 η_{oeN} by

$$\eta_{oeN} = \frac{-q \cdot h}{2 \cdot \pi \cdot m_e} \cdot \left(\frac{Q_{eN}^v}{l_{eN}^v}\right)^2 = \frac{-1.8361821023503453482585815410 9\times 10^{-23}}{(-1.8342356455597964866284314797 9\times 10^{-23})} \text{ A.m}^2 \quad 230$$

Is given the orbital magnetic dipole moment of the solitary electron in ionized helium 4 η_{oeI} by

$$\eta_{oeI} = \frac{-q \cdot h}{4 \cdot \pi \cdot m_e} \cdot \left(\frac{Q_{eI}^v}{l_{eI}^v}\right)^2 = \frac{-9.2370007246619128233632307152 1\times 10^{-24}}{(-9.2272089819138448630065496069 7\times 10^{-24})} \text{ A.m}^2 \quad 231$$

Is given the orbital magnetic dipole moment of the complete protonic orbital one η_{op1} by

$$\eta_{op1} = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(\frac{Q_p^v}{l_p^v}\right)^2 = \frac{8.9050458986544390618410857493 9\times 10^{-27}}{(9.3110048117160712189736678267 2\times 10^{-27})} \text{ A.m}^2 \quad 232$$

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

$$\eta_{op2} = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(\frac{Q_p^v}{l_p^v}\right)^2 = \frac{8.9050458986544390618410857493 9\times 10^{-27}}{(9.3110048117160712189736678267 2\times 10^{-27})} \text{ A.m}^2 \quad 233$$

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

$$\eta_{on} = \frac{-q \cdot h}{2 \cdot \pi \cdot m_n} \cdot \frac{1}{\left(Q_n^r\right)^2} = \frac{-9.2632313965662056642265995820 4\times 10^{-26}}{(-9.1869174309110276312023329046 5\times 10^{-26})} \text{ A.m}^2 \quad 234$$

The spin magnetic dipole moment of helium 4

Is given the spin magnetic dipole moment of electrons in normal helium 4 η_{seN} by

$$\eta_{seN} = \frac{-q \cdot h}{2 \cdot \pi \cdot m_e} \cdot \left(1 - \frac{\left(Q_{eN}^v\right)^2}{\left(l_{eN}^v\right)^4}\right) = \frac{-1.8567102059507933944332293578 3\times 10^{-23}}{(-1.8547419882103919051054124197 9\times 10^{-23})} \text{ A.m}^2 \quad 235$$

Is given the spin magnetic dipole moment of the solitary electron in ionized helium 4 η_{seI} by

$$\eta_{seI} = \frac{-q \cdot h}{4 \cdot \pi \cdot m_e} \cdot \left(1 - \frac{\left(Q_{eI}^v\right)^2}{\left(l_{eI}^v\right)^4}\right) = \frac{-9.2818531933230206882024570888 1\times 10^{-24}}{(-9.2720139044235729266356107472 0\times 10^{-24})} \text{ A.m}^2 \quad 236$$

Is given the spin magnetic dipole moment of the complete protonic orbital one η_{sp1} by

$$\eta_{sp1} = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right) = \frac{1.0083853154471467458824309703 6\times 10^{-26}}{(1.0065195718647309672185040809 8\times 10^{-26})} \text{ A.m}^2 \quad 237$$

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

$$\eta_{sp2} = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right) = \frac{1.0083853154471467458824309703 6\times 10^{-26}}{(1.0065195718647309672185040809 8\times 10^{-26})} \text{ A.m}^2 \quad 238$$

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

$$\eta_{sn} = \frac{-q \cdot h}{2 \cdot \pi \cdot m_n \cdot (299,792,458.)} \cdot \left(1 - \frac{1}{\left(Q_n^r\right)^2}\right) = \frac{-2.0640437451315735347588253289 6\times 10^{-32}}{(-2.4441012849479263035716704754 8\times 10^{-32})} \text{ A.m}^2 \quad 239$$

Orbital: Gyromagnetic ratios and Landé factors of helium 4

Is given the gyromagnetic ratio γ_{OeN} and Landé factor g_{OeN} of the electronic orbital in normal helium 4 by

the resultant of the angular momentum is

$$\varphi_{OeN} = \sqrt{(\varphi_{oeN})^2 + (\varphi_{seN})^2} = \begin{matrix} 2.9662401382605840913995987220 5\times 10^{-34} \\ (2.9662401382605845190419523368 0\times 10^{-34}) \end{matrix} \text{ kg.m}^2\text{.s}^{-1} \quad 240$$

the resultant of the magnetic moment is

$$\eta_{OeN} = \sqrt{(\eta_{oeN})^2 + (\eta_{seN})^2} = \begin{matrix} 2.611309537736492071674674909 74\times 10^{-23} \\ (2.608541402062233190491599223 95\times 10^{-23}) \end{matrix} \text{ A.m}^2 \quad 241$$

then

$$\gamma_{OeN} = \frac{\eta_{OeN}}{\varphi_{OeN}} = \frac{q}{2\cdot m_e} = \begin{matrix} 8.803432682519679260253906250 00\times 10^{10} \\ (8.794100546397071838378906250 00\times 10^{10}) \end{matrix} \text{ Hz.T}^{-1} \quad 242$$

$$g_{OeN} = 2\cdot\frac{2\cdot m_e}{q}\cdot\gamma_{OeN} = 2\cdot\frac{2\cdot m_e}{q}\cdot\frac{q}{2\cdot m_e} = 2. \quad 243$$

Is given the gyromagnetic ratio γ_{OeI} and Landé factor g_{OeI} of the electronic orbital in ionized helium 4 by

the resultant of the angular momentum is

$$\varphi_{OeI} = \sqrt{(\varphi_{oeI})^2 + (\varphi_{seI})^2} = \begin{matrix} 1.487470406678969401789528871 23\times 10^{-34} \\ (1.487470406678969829431882485 98\times 10^{-34}) \end{matrix} \text{ kg.m}^2\text{.s}^{-1} \quad 244$$

the resultant of the magnetic moment is

$$\eta_{OeI} = \sqrt{(\eta_{oeI})^2 + (\eta_{seI})^2} = \begin{matrix} 1.309484559243847805151785228 09\times 10^{-23} \\ (1.308096431612499961895942039 57\times 10^{-23}) \end{matrix} \text{ A.m}^2 \quad 245$$

then

$$\gamma_{OeI} = \frac{\eta_{OeI}}{\varphi_{OeI}} = \frac{q}{2\cdot m_e} = \begin{matrix} 8.803432682519679260253906250 00\times 10^{10} \\ (8.794100546397070312500000000 00\times 10^{10}) \end{matrix} \text{ Hz.T}^{-1} \quad 246$$

$$g_{OeI} = 2\cdot\frac{m_e}{q}\cdot\gamma_{OeI} = 2\cdot\frac{m_e}{q}\cdot\frac{q}{2\cdot m_e} = 1. \quad 247$$

Is given the gyromagnetic ratio γ_{O1p} and Landé factor g_{O1p} of the protonic orbital one by

the resultant of the angular momentum is

$$\varphi_{O1p} = \sqrt{(\varphi_{op1})^2 + (\varphi_{sp1})^2} = \begin{matrix} 2.804168048210274676355828763 40\times 10^{-34} \\ (2.862857431432766843036927706 03\times 10^{-34}) \end{matrix} \text{ kg.m}^2\text{.s}^{-1} \quad 248$$

the resultant of the magnetic moment is

$$\eta_{O1p} = \sqrt{(\eta_{op1})^2 + (\eta_{sp1})^2} = \begin{matrix} 1.345302705334700432470220834 76\times 10^{-26} \\ (1.371141770417909549817457281 69\times 10^{-26}) \end{matrix} \text{ A.m}^2 \quad 249$$

then

$$\gamma_{O1p} = \frac{\eta_{O1p}}{\varphi_{O1p}} = \frac{q}{2\cdot m_p} = \begin{matrix} 4.797510998648326843976974487 30\times 10^{7} \\ (4.789416878966612368822097778 32\times 10^{7}) \end{matrix} \text{ Hz.T}^{-1} \quad 250$$

$$g_{O1p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\gamma_{O1p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\frac{q}{2\cdot m_p} = 2. \quad 251$$

The Helium family - Stability and Gyromagnetic ratios

Is given the gyromagnetic ratio γ_{O2p} and Landé factor g_{O2p} of the protonic orbital two by

the resultant of the angular momentum is

$$\varphi_{O2p} = \sqrt{(\varphi_{op2})^2 + (\varphi_{sp2})^2} = \frac{2.804168048210274676355828763 40\times10^{-34}}{(2.862857431432766843036927706 03\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 252$$

the resultant of the magnetic moment is

$$\eta_{O2p} = \sqrt{(\eta_{op2})^2 + (\eta_{sp2})^2} = \frac{1.345302705334700432470220834 76\times10^{-26}}{(1.371141770417909549817457281 69\times10^{-26})} \text{ A.m}^2 \quad 253$$

then

$$\gamma_{O2p} = \frac{\eta_{O2p}}{\varphi_{O2p}} = \frac{q}{2\cdot m_p} = \frac{4.797510998648326843976974487 30\times10^{7}}{(4.789416878966612368822097778 32\times10^{7})} \text{ Hz.T}^{-1} \quad 254$$

$$g_{O2p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\gamma_{O2p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\frac{q}{2\cdot m_p} = 2. \quad 255$$

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

the resultant of the angular momentum is

$$\varphi_{Op} = \sqrt{(\varphi_{op1} + \varphi_{sp2})^2 + (\varphi_{sp1} - \varphi_{op2})^2} =$$

$$= \frac{3.965692484952261660744807031 21\times10^{-34}}{(4.048691806672821445676296836 72\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 256$$

the resultant of the magnetic moment is

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

$$= \frac{1.902545331381549029227566186 65\times10^{-26}}{(1.939087287661264431066264713 59\times10^{-26})} \text{ A.m}^2 \quad 257$$

then

$$\gamma_{Op} = \frac{\eta_{Op}}{\varphi_{Op}} = \frac{q}{2\cdot m_p} = \frac{4.797510998648326843976974487 30\times10^{7}}{(4.789416878966613858938217163 09\times10^{7})} \text{ Hz.T}^{-1} \quad 258$$

$$g_{Op} = 2\cdot\frac{4\cdot m_p}{q}\cdot\gamma_{Op} = 2\cdot\frac{4\cdot m_p}{q}\cdot\frac{q}{2\cdot m_p} = 4. \quad 259$$

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

the resultant of the angular momentum is

$$\varphi_{On} = \sqrt{(\varphi_{on})^2 + (\varphi_{sn})^2} = \frac{3.156688440962265786210505603 71\times10^{-36}}{(2.644038384607081261519969143 24\times10^{-36})} \text{ kg.m}^2.\text{s}^{-1} \quad 260$$

the resultant of the magnetic moment is

$$\eta_{On} = \sqrt{(\eta_{on})^2 + (\eta_{sn})^2} = \frac{9.263231396566435252966994560 07\times10^{-26}}{(9.186917430911352499269991798 56\times10^{-26})} \text{ A.m}^2 \quad 261$$

then

$$\gamma_{On} = \frac{\eta_{On}}{\varphi_{On}} = \frac{q}{2\cdot m_n} = \frac{2.934477560839893341064453125 00\times10^{10}}{(3.474577935174938964843750000 00\times10^{10})} \text{ Hz.T}^{-1} \quad 262$$

$$g_{On} = 2\cdot\frac{2\cdot m_n}{q}\cdot\gamma_{On} = 2\cdot\frac{2\cdot m_n}{q}\cdot\frac{q}{2\cdot m_n} = 2. \quad 263$$

Nucleus: Gyromagnetic ratios and Landé factors of helium 4

Is given the gyromagnetic ratio γ_N and Landé factor g_N of nucleus by

the resultant of the angular momentum is

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

$$= \frac{h}{\pi}\cdot\sqrt{\left(1+\frac{1}{Q_n^r}-\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}-\left(\frac{Q_p^v}{l_p^v}\right)^2\right)^2+\left(1-\frac{1}{c}+\frac{1}{c\cdot\left(Q_n^r\right)^2}-\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}+\left(\frac{Q_p^v}{l_p^v}\right)^2\right)^2} =$$

$$= \frac{3.9677734358897084432708263065\,8\times10^{-34}}{\left(4.0498063574311957874092905988\,8\times10^{-34}\right)}\ \text{kg.m}^2.\text{s}^{-1} \qquad 264$$

the resultant of the magnetic moment is

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

$$= \frac{q\cdot h}{2\cdot\pi}\cdot\sqrt{\begin{array}{l}\left(\frac{\left(Q_n^r\right)^2-1}{c\cdot m_n\cdot\left(Q_n^r\right)^2}+\frac{\left(l_p^v\right)^4-\left(Q_p^v\right)^2+\left(l_p^v\right)^2\cdot\left(Q_p^v\right)^2}{m_p\cdot\left(l_p^v\right)^4}\right)^2+\\ +\left(\frac{1}{m_n\cdot Q_n^r}+\frac{1}{m_p}\cdot\left(\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}+\left(\frac{Q_p^v}{l_p^v}\right)^2-1\right)\right)^2\end{array}} =$$

$$= \frac{9.3404084282520914141056756019\,6\times10^{-26}}{\left(9.3152446529979789251189851912\,0\times10^{-26}\right)}\ \text{A.m}^2 \qquad 265$$

then

$$\gamma_N = \frac{\eta_N}{\varphi_N} = \frac{2.3540679877951893210411071777\,3\times10^{8}}{\left(2.3001703861482071876525878906\,3\times10^{8}\right)}\ \text{Hz.T}^{-1} \qquad 266$$

$$g_N = 2\cdot\frac{4\cdot m_p+2\cdot m_n}{q}\cdot\gamma_N = \frac{19.643455072566016639257213682\,9}{\left(19.223682057003649958915048046\,0\right)} \qquad 267$$

Atom: Gyromagnetic ratios and Landé factors of normal helium 4

Is given the gyromagnetic ratio γ_{TN} and Landé factor g_{TN} of normal helium 4 atom by

the resultant of the angular momentum is

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

$$= \frac{h}{\pi}\cdot\sqrt{\begin{array}{l}\left(1+\frac{1}{Q_n^r}-\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}-\left(\frac{Q_p^v}{l_p^v}\right)^2+\left(\frac{Q_{eN}^v}{l_{eN}^v}\right)^2\right)^2+\\ +\left(-\frac{1}{c}+\frac{1}{c\cdot\left(Q_n^r\right)^2}-\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}+\left(\frac{Q_p^v}{l_p^v}\right)^2+\frac{\left(Q_{eN}^v\right)^2}{\left(l_{eN}^v\right)^4}\right)^2\end{array}} =$$

$$= \frac{3.0004553805418282495148251133\,4\times10^{-34}}{\left(2.9835597753919126220504436191\,8\times10^{-34}\right)}\ \text{kg.m}^2.\text{s}^{-1} \qquad 268$$

the resultant of the magnetic moment is

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

$$= \frac{q\cdot h}{2\cdot\pi}\cdot\sqrt{\begin{array}{l}\left(\frac{1}{m_n\cdot Q_n^r}+\frac{1}{m_p}\cdot\left(\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}+\left(\frac{Q_p^v}{l_p^v}\right)^2-1\right)+\frac{1}{m_e}\cdot\left(\frac{Q_{eN}^v}{l_{eN}^v}\right)^2\right)^2+\\ +\left(\frac{\left(Q_n^r\right)^2-1}{c\cdot m_n\cdot\left(Q_n^r\right)^2}+\frac{\left(l_p^v\right)^4-\left(Q_p^v\right)^2+\left(l_p^v\right)^2\cdot\left(Q_p^v\right)^2}{m_p\cdot\left(l_p^v\right)^4}+\frac{1}{m_e}\cdot\left(1-\frac{\left(Q_{eN}^v\right)^2}{\left(l_{eN}^v\right)^4}\right)\right)^2\end{array}} =$$

$$= \frac{2.6190954903832243350001267925\,2\times10^{-23}}{\left(2.6163309939190426768943799558\,8\times10^{-23}\right)}\ \text{A.m}^2 \qquad 269$$

then

$$\gamma_{TN} = \frac{\eta_{TN}}{\varphi_{TN}} = \frac{8.7289932967117218017578125000 \times 10^{10}}{\left(8.7691589607095046997070312500 \times 10^{10}\right)} \text{ Hz.T}^{-1} \quad 270$$

$$g_{TN} = 2 \cdot \frac{4 \cdot m_p + 2 \cdot m_n + 2 \cdot m_e}{q} \cdot \gamma_{TN} = \frac{7285.8673494030381334596313536 2}{\left(7330.8219998648683031206019222 7\right)} \quad 271$$

Atom: Gyromagnetic ratios and Landé factors of ionized helium 4

Is given the gyromagnetic ratio γ_{TI} and Landé factor g_{TI} of ionized helium 4 atom by

the resultant of the angular momentum is

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

$$= \frac{h}{2 \cdot \pi} \cdot \sqrt{\begin{array}{l} \left(2 + \frac{2}{Q_n^r} - \frac{2 \cdot \left(Q_p^v\right)^2}{\left(l_p^v\right)^4} - 2 \cdot \left(\frac{Q_p^v}{l_p^v}\right)^2 + \left(\frac{Q_{eI}^v}{l_{eI}^v}\right)^2\right)^2 + \\ + \left(1 - \frac{2}{c} + \frac{2}{c \cdot \left(Q_n^r\right)^2} - \frac{2 \cdot \left(Q_p^v\right)^2}{\left(l_p^v\right)^4} + 2 \cdot \left(\frac{Q_p^v}{l_p^v}\right)^2 + \frac{\left(Q_{eI}^v\right)^2}{\left(l_{eI}^v\right)^4}\right)^2 \end{array}} =$$

$$= \frac{3.1923842538361587099461607625 0 \times 10^{-34}}{\left(3.2355002995585434530903515657 7 \times 10^{-34}\right)} \text{ kg.m}^2\text{.s}^{-1} \quad 272$$

the resultant of the magnetic moment is

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

$$= \frac{q \cdot h}{4 \cdot \pi} \cdot \sqrt{\begin{array}{l} \left(\frac{2 \cdot \left(\left(Q_n^r\right)^2 - 1\right)}{c \cdot m_n \cdot \left(Q_n^r\right)^2} + \frac{1}{m_p} \cdot \left(2 - \frac{2 \cdot \left(Q_p^v\right)^2}{\left(l_p^v\right)^4} + 2 \cdot \left(\frac{Q_p^v}{l_p^v}\right)^2\right) + \frac{1}{m_e} \cdot \left(\frac{Q_{eI}^v}{l_{eI}^v}\right)^2\right)^2 + \\ + \left(\frac{1}{m_p} \cdot \left(2 - \frac{2 \cdot \left(Q_p^v\right)^2}{\left(l_p^v\right)^4} - 2 \cdot \left(\frac{Q_p^v}{l_p^v}\right)^2\right) - \frac{2}{m_n \cdot Q_n^r} + \frac{1}{m_e} \cdot \left(\frac{\left(Q_{eI}^v\right)^2}{\left(l_{eI}^v\right)^4} - 1\right)^2\right)^2 \end{array}} =$$

$$= \frac{1.3173162975887638356297966521 3 \times 10^{-23}}{\left(1.3159313073189866495000879103 9 \times 10^{-23}\right)} \text{ A.m}^2 \quad 273$$

then

$$\gamma_{TI} = \frac{\eta_{TI}}{\varphi_{TI}} = \frac{4.1264340155975845336914062500 0 \times 10^{10}}{\left(4.0671648446409797668457031250 0 \times 10^{10}\right)} \text{ Hz.T}^{-1} \quad 274$$

$$g_{TI} = 2 \cdot \frac{4 \cdot m_p + 2 \cdot m_n + m_e}{q} \cdot \gamma_{TI} = \frac{3443.7601565118438884383067488 7}{\left(3399.5969310260152269620448350 9\right)} \quad 275$$

Summary of helium 4

First part - Calculations performed according to NIST constants

Table 1: The orbital gyromagnetic ratios and Landé factor of helium 4.

Particle in orbit		Gyromagnetic ratio $Hz.T^{-1}$	Landé factor
Electrons	normal	$8.7941005463970718383789062500 0\times10^{10}$	2.
Electrons	ionized	$8.794100546397070312500000000 00\times10^{10}$	1.
Protons	Orbital 1	$4.789416878966612368822097778 32\times10^{7}$	2.
Protons	Orbital 2	$4.789416878966612368822097778 32\times10^{7}$	2.
Protons	Total	$4.789416878966613858938217163 09\times10^{7}$	4.
Negatron		$3.474577935174938964843750000 00\times10^{10}$	2.

Table 2: The nuclear gyromagnetic ratios and Landé factor of helium 4.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$2.30017038614820718765258789063\times10^{8}$	$Hz.T^{-1}$
Landé factor	19.2236820570036499589150480460	Dimensionless

Table 3: The atomic gyromagnetic ratios and Landé factor of the normal helium 4.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$8.76915896070950469970703125000\times10^{10}$	$Hz.T^{-1}$
Landé factor	7330.82199986486830312060192227	Dimensionless

Table 4: The atomic gyromagnetic ratios and Landé factor of the ionized helium 4.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$4.06716484464097976684570312500\times10^{10}$	$Hz.T^{-1}$
Landé factor	3399.59693102601522696204483509	Dimensionless

The Helium family - Stability and Gyromagnetic ratios

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

Table 5: The orbital gyromagnetic ratios and Landé factor of helium 4.

Particle in orbit		Gyromagnetic ratio Hz.T^{-1}	Landé factor
Electrons	normal	$8.803432682519679260253906250000 \times 10^{10}$	2.
Electrons	ionized	$8.803432682519679260253906250000 \times 10^{10}$	1.
Protons	Orbital 1	$4.797510998648326843976974487300 \times 10^{7}$	2.
Protons	Orbital 2	$4.797510998648326843976974487300 \times 10^{7}$	2.
Protons	Total	$4.797510998648326843976974487300 \times 10^{7}$	4.
Negatron		$2.934477560839893341064453125000 \times 10^{10}$	2.

Table 6: The nuclear gyromagnetic ratios and Landé factor of helium 4.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$2.354067987795189321041107177730 \times 10^{8}$	Hz.T^{-1}
Landé factor	19.6434550725660166392572136829	Dimensionless

Table 7: The atomic gyromagnetic ratios and Landé factor of the normal helium 4.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$8.728993296711721801757812500000 \times 10^{10}$	Hz.T^{-1}
Landé factor	7285.86734940303813345963135362	Dimensionless

Table 8: The atomic gyromagnetic ratios and Landé factor of the ionized helium 4.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$4.126434015597584533691406250000 \times 10^{10}$	Hz.T^{-1}
Landé factor	3443.76015651184388843830674887	Dimensionless

GYROMAGNETIC RATIOS of HELIUM 5

Canal of Beagle - Ushuaia - Argentina Credit: **Geo Okretic** Buenos Aires, Argentina (STOCKXPERT 474385)

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Initial note on gyromagnetic ratios of helium 5

This publication correct and update the magnitudes given to helium 5 $^{5}\boldsymbol{He}$ 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 *"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 helium 5

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 helium 5 particles. Then, there is a concise of these summarized magnitudes.

Is established the quantum state of the electrons in normal (letter "***N***" as right subindex in the variable) helium 5 by following relationship

$$Q^{v}_{eN} = \frac{2\cdot\pi\cdot c\cdot m_e\cdot r_{eN}}{h} = \frac{174.027086445491562471943325363}{(174.027086445491562471943325363)} \quad \therefore \quad l^{v}_{eN} = \frac{175.}{(175.)} \qquad 276$$

where Q^{v}_{eN} is the quantum vectorial number calculated for electrons, c is the speed of the light, m_e is the inertial mass of electron, r_{eN} is the orbit radius of electrons (according to expression number **5** and **6**), h is the constant of Planck and l^{v}_{eN} is the quantum state of the electrons (the bigger integer most closely whereby the value has been calculated).

Is established the quantum state of the electrons in ionized (letter "***I***" as right subindex in the variable) helium 5 by following relationship

$$Q^{v}_{eI} = \frac{2\cdot\pi\cdot c\cdot m_e\cdot r_{eI}}{h} = \frac{67.8282051505025407323046238162}{(67.8282051505025407323046238162)} \quad \therefore \quad l^{v}_{eI} = \frac{68.}{(68.)} \qquad 277$$

where Q^{v}_{eI} is the quantum vectorial number calculated for electron, r_{eI} is the orbit radius of electron (according to expression number **12** and **13**) and l^{v}_{eI} 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

$$Q^{v}_{p} = \frac{2\cdot\pi\cdot c\cdot m_p\cdot r_p}{h} = \frac{20.9041767661129362920746643795}{(19.6468828538891138180133566493)} \quad \therefore \quad l^{v}_{p} = \frac{21.}{(20.)} \qquad 278$$

where Q^{v}_{p} is the quantum vectorial number calculated for protons, m_p is the inertial mass of proton, r_p is the orbit radius of protons (according to expression number **78** and **79**) and l^{v}_{p} 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

$$Q^{r}_{n} = \frac{h}{2\cdot\pi\cdot c\cdot m_n\cdot r_n} = \frac{44.5813288824833122703239496332}{(58.5901005626498161404924758244)} \quad \therefore \quad l^{r}_{n} = \frac{44.}{(58.)} \qquad 279$$

where Q^{r}_{n} is the quantum radial number calculated for negatron, m_n is the inertial mass of negatron, r_n is the orbit radius of negatrons (according to expression number **80** and **81**) and $\boldsymbol{l}_n^r$ is the quantum state of the negatrons (the smallest integer most closely whereby the value has been calculated).

Is given the radius of orbits to (according to expression number **276**, **277**, **278** and **279**)

electrons (normal) $$\boldsymbol{r}_{eN} = \frac{\boldsymbol{h}\cdot\boldsymbol{Q}_{eN}^{v}}{2\cdot\pi\cdot\boldsymbol{c}\cdot\boldsymbol{m}_e} = \frac{6.7273485508664138305744853917 4\times10^{-11}}{\left(6.7202171812422034226128477848 6\times10^{-11}\right)} \text{ meter} \quad \textbf{280}$$

electrons (ionized) $$\boldsymbol{r}_{eI} = \frac{\boldsymbol{h}\cdot\boldsymbol{Q}_{eI}^{v}}{2\cdot\pi\cdot\boldsymbol{c}\cdot\boldsymbol{m}_e} = \frac{2.62202848388216708327694153221\times10^{-11}}{\left(2.61924898551927037597275612172\times10^{-11}\right)} \text{ meter} \quad \textbf{281}$$

proton $$\boldsymbol{r}_{p} = \frac{\boldsymbol{h}\cdot\boldsymbol{Q}_{p}^{v}}{2\cdot\pi\cdot\boldsymbol{c}\cdot\boldsymbol{m}_p} = \frac{4.40376444510688055471265776922\times10^{-15}}{\left(4.13191452232807223115759260864\times10^{-15}\right)} \text{ meter} \quad \textbf{282}$$

negatron $$\boldsymbol{r}_{n} = \frac{\boldsymbol{h}}{2\cdot\pi\cdot\boldsymbol{c}\cdot\boldsymbol{m}_n\cdot\boldsymbol{Q}_n^r} = \frac{2.89036583884015096428057451552\times10^{-15}}{\left(2.60407115251216376946294760175\times10^{-15}\right)} \text{ meter} \quad \textbf{283}$$

Is given the radius of spin $\boldsymbol{r}_{sx}$ (sub-index x identifies to the particle) to

electrons (normal) $$\boldsymbol{r}_{seN} = \frac{\boldsymbol{h}}{2\cdot\pi\cdot\boldsymbol{c}\cdot\boldsymbol{m}_e}\sqrt{1-\frac{\left(\boldsymbol{Q}_{eN}^{v}\right)^2}{\left(\boldsymbol{l}_{eN}^{v}\right)^4}} = \frac{3.86562808754964695726858698706\times10^{-13}}{\left(3.86153030333145070890139618987\times10^{-13}\right)} \text{ meter} \quad \textbf{284}$$

electrons (ionized) $$\boldsymbol{r}_{seI} = \frac{\boldsymbol{h}}{2\cdot\pi\cdot\boldsymbol{c}\cdot\boldsymbol{m}_e}\sqrt{1-\frac{\left(\boldsymbol{Q}_{eI}^{v}\right)^2}{\left(\boldsymbol{l}_{eI}^{v}\right)^4}} = \frac{3.86527458573324325699659233331\times10^{-13}}{\left(3.86117717624694861817004497046\times10^{-13}\right)} \text{ meter} \quad \textbf{285}$$

proton $$\boldsymbol{r}_{sp} = \frac{\boldsymbol{h}}{2\cdot\pi\cdot\boldsymbol{c}\cdot\boldsymbol{m}_p}\sqrt{1-\frac{\left(\boldsymbol{Q}_{P}^{v}\right)^2}{\left(\boldsymbol{l}_{P}^{v}\right)^4}} = \frac{2.10427525727065093287440417528\times10^{-16}}{\left(2.10422240845382312295093979160\times10^{-16}\right)} \text{ meter} \quad \textbf{286}$$

negatron $$\boldsymbol{r}_{sn} = \frac{\boldsymbol{h}}{2\cdot\pi\cdot\boldsymbol{c}\cdot\boldsymbol{m}_n\cdot(299,792,458.)}\sqrt{1-\frac{1}{\left(\boldsymbol{Q}_{n}^{r}\right)^2}} =$$

$$= \frac{4.29710373828495751649125482724\times10^{-22}}{\left(4.29749777216828933463469599746\times10^{-22}\right)} \text{ meter} \quad \textbf{287}$$

Is given the orbit medium tangential speed to

electrons (normal) $$\boldsymbol{v}_{eN} = \boldsymbol{c}\cdot\frac{\boldsymbol{Q}_{eN}^{v}}{\left(\boldsymbol{l}_{eN}^{v}\right)^2} = \frac{1.70357577156154741533100605011\times10^{6}}{\left(1.70357577156154741533100605011\times10^{6}\right)} \text{ m.s}^{-1} \quad \textbf{288}$$

electrons (ionized) $$\boldsymbol{v}_{eI} = \boldsymbol{c}\cdot\frac{\boldsymbol{Q}_{eI}^{v}}{\left(\boldsymbol{l}_{eI}^{v}\right)^2} = \frac{4.39757446881431993097066879272\times10^{6}}{\left(4.39757446881431993097066879272\times10^{6}\right)} \text{ m.s}^{-1} \quad \textbf{289}$$

proton $$\boldsymbol{v}_{p} = \boldsymbol{c}\cdot\frac{\boldsymbol{Q}_{p}^{v}}{\left(\boldsymbol{l}_{p}^{v}\right)^2} = \frac{1.42106905559625588357448577881\times10^{7}}{\left(1.43682973364683762192726135254\times10^{7}\right)} \text{ m.s}^{-1} \quad \textbf{290}$$

negatron $$\boldsymbol{v}_{n} = \boldsymbol{c} = 299,792,458. \text{ m.s}^{-1} \quad \textbf{291}$$

Is given the spin medium tangential speed $\boldsymbol{v}_{sx}$ (sub-index x identifies to the particle) to

electrons (normal) $$\boldsymbol{v}_{seN} = \boldsymbol{c}\cdot\sqrt{1-\frac{\left(\boldsymbol{Q}_{eN}^{v}\right)^2}{\left(\boldsymbol{l}_{eN}^{v}\right)^4}} = \frac{2.99787617661691129207611083984\times10^{8}}{\left(2.99787617661691129207611083984\times10^{8}\right)} \text{ m.s}^{-1} \quad \textbf{292}$$

electrons (ionized) $$\boldsymbol{v}_{seI} = \boldsymbol{c}\cdot\sqrt{1-\frac{\left(\boldsymbol{Q}_{eI}^{v}\right)^2}{\left(\boldsymbol{l}_{eI}^{v}\right)^4}} = \frac{2.99760202849666178226470947266\times10^{8}}{\left(2.99760202849666178226470947266\times10^{8}\right)} \text{ m.s}^{-1} \quad \textbf{293}$$

proton $$\boldsymbol{v}_{sp} = \boldsymbol{c}\cdot\sqrt{1-\frac{\left(\boldsymbol{Q}_{P}^{v}\right)^2}{\left(\boldsymbol{l}_{P}^{v}\right)^4}} = \frac{2.99455462711242675781250000000\times10^{8}}{\left(2.99447941895302712917327880859\times10^{8}\right)} \text{ m.s}^{-1} \quad \textbf{294}$$

negatron $$\boldsymbol{v}_{sn} = \boldsymbol{c}\cdot\sqrt{1-\frac{1}{\left(\boldsymbol{Q}_{n}^{r}\right)^2}} = \frac{2.99717028830444991588592529297\times10^{8}}{\left(2.99744512147572934627532958984\times10^{8}\right)} \text{ m.s}^{-1} \quad \textbf{295}$$

The orbital angular momentum of helium 5

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 electrons in normal helium 5 φ_{oeN} by

$$\varphi_{oeN} = 2 \cdot m_e \cdot v_{eN} \cdot r_{eN} = \frac{2.0857569638674184625580502 2225 \times 10^{-34}}{(2.0857569638674188902004038 3700 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 296$$

Is given the orbital angular momentum of the solitary electron in ionized helium 5 φ_{oeI} by

$$\varphi_{oeI} = m_e \cdot v_{eI} \cdot r_{eI} = \frac{1.0492498844232812866287998 4714 \times 10^{-34}}{(1.0492498844232817142711534 6189 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 297$$

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

$$\varphi_{op1} = m_p \cdot v_p \cdot r_p = \frac{1.0449695950121508992031026 8174 \times 10^{-34}}{(1.0176616889692497842723829 8279 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 298$$

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

$$\varphi_{op2} = 2 \cdot m_p \cdot v_p \cdot r_p = \frac{2.0899391900243017984062053 6348 \times 10^{-34}}{(2.0353233779384995685447659 6557 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 299$$

Is given the orbital angular momentum of the complete protonic orbital three φ_{op3} by

$$\varphi_{op3} = 2 \cdot m_p \cdot v_p \cdot r_p = \frac{2.0899391900243017984062053 6348 \times 10^{-34}}{(2.0353233779384995685447659 6557 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 300$$

Is given the orbital angular momentum of the solitary negatron orbital one φ_{on1} by

$$\varphi_{on1} = m_n \cdot v_n \cdot r_n = \frac{2.3655007798092179598285921 4763 \times 10^{-36}}{(1.7999144432886097466607478 3629 \times 10^{-36})} \text{ kg.m}^2.\text{s}^{-1} \qquad 301$$

Is given the orbital angular momentum of the complete negatronic orbital two φ_{on2} by

$$\varphi_{on2} = 2 \cdot m_n \cdot v_n \cdot r_n = \frac{4.7310015596184365878483618 1831 \times 10^{-36}}{(3.5998288865772194933214956 7258 \times 10^{-36})} \text{ kg.m}^2.\text{s}^{-1} \qquad 302$$

The spin angular momentum of helium 5

Is given the spin angular momentum of electrons in normal helium 5 φ_{seN} by

$$\varphi_{seN} = 2 \cdot m_e \cdot v_{seN} \cdot r_{seN} = \frac{2.1090752583790692786553309 7886 \times 10^{-34}}{(2.1090752583790697062976845 9361 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 303$$

Is given the spin angular momentum of the solitary electron in ionized helium 5 φ_{seI} by

$$\varphi_{seI} = m_e \cdot v_{seI} \cdot r_{seI} = \frac{1.0543447684621143632171641 1938 \times 10^{-34}}{(1.0543447684621145770383409 2676 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 304$$

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

$$\varphi_{sp1} = m_p \cdot v_{sp} \cdot r_{sp} = \frac{1.0522021367975342061786162 3357 \times 10^{-34}}{(1.0520275281420319123509763 6136 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \qquad 305$$

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

$$\varphi_{sp2} = 2 \cdot m_p \cdot v_{sp} \cdot r_{sp} = \frac{2.104404273595068412357232467 13\times10^{-34}}{(2.104055056284063397059599107 96\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 306$$

Is given the spin angular momentum of the complete protonic orbital three φ_{sp3} by

$$\varphi_{sp3} = 2 \cdot m_p \cdot v_{sp} \cdot r_{sp} = \frac{2.10440427359506841235723246713\times10^{-34}}{(2.10405505628406339705959910796\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 307$$

Is given the spin angular momentum of the solitary negatron orbital one φ_{sn1} by

$$\varphi_{sn1} = m_n \cdot v_{sn} \cdot r_{sn} = \frac{3.51590258783144058788543911375\times10^{-43}}{(3.51664776647679822183371524301\times10^{-43})} \text{ kg.m}^2.\text{s}^{-1} \quad 308$$

Is given the spin angular momentum of the complete negatronic orbital two φ_{sn2} by

$$\varphi_{sn2} = 2 \cdot m_n \cdot v_{sn} \cdot r_{sn} = \frac{7.03180517566288117577087822750\times10^{-43}}{(7.03329553295359644366743048603\times10^{-43})} \text{ kg.m}^2.\text{s}^{-1} \quad 309$$

The orbital magnetic dipole moment of helium 5

Regarding the calculation of magnetic dipole moments, see "*The Hydrogen family – Stability and gyromagnetic ratios*" in the section "*The magnetic dipole moment*" on page 25.

Is given the orbital magnetic dipole moment of electrons in normal helium 5 η_{oeN} by

$$\eta_{oeN} = \frac{-q \cdot h}{2 \cdot \pi \cdot m_e} \cdot \left(\frac{Q^v_{eN}}{l^v_{eN}}\right)^2 = \frac{-1.83618210235034534825858154109\times10^{-23}}{(-1.83423564555979648662843147979\times10^{-23})} \text{ A.m}^2 \quad 310$$

Is given the orbital magnetic dipole moment of the solitary electron in ionized helium 5 η_{oeI} by

$$\eta_{oeI} = \frac{-q \cdot h}{4 \cdot \pi \cdot m_e} \cdot \left(\frac{Q^v_{eI}}{l^v_{eI}}\right)^2 = \frac{-9.23700072466191282336323071521\times10^{-24}}{(-9.22720898191384486300654960697\times10^{-24})} \text{ A.m}^2 \quad 311$$

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

$$\eta_{op1} = \frac{q \cdot h}{4 \cdot \pi \cdot m_p} \cdot \left(\frac{Q^v_p}{l^v_p}\right)^2 = \frac{5.01325312532388120052484374430\times10^{-27}}{(4.87400607022699527223000519361\times10^{-27})} \text{ A.m}^2 \quad 312$$

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

$$\eta_{op2} = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(\frac{Q^v_p}{l^v_p}\right)^2 = \frac{1.00265062506477624010496874886\times10^{-26}}{(9.74801214045399054446001038721\times10^{-27})} \text{ A.m}^2 \quad 313$$

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

$$\eta_{op3} = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(\frac{Q^v_p}{l^v_p}\right)^2 = \frac{1.00265062506477624010496874886\times10^{-26}}{(9.74801214045399054446001038721\times10^{-27})} \text{ A.m}^2 \quad 314$$

Is given the orbital magnetic dipole moment of the solitary negatron orbital one η_{on1} by

$$\eta_{on1} = \frac{-q \cdot h}{4 \cdot \pi \cdot m_n} \cdot \frac{1}{\left(Q^v_n\right)^2} = \frac{-6.94150895849941946453168502805\times10^{-26}}{(-6.25394300985328669343448114487\times10^{-26})} \text{ A.m}^2 \quad 315$$

Is given the orbital magnetic dipole moment of the complete negatronic orbital two η_{on2} by

$$\eta_{on2} = \frac{-q \cdot h}{2 \cdot \pi \cdot m_n} \cdot \frac{1}{\left(Q_n^r\right)^2} = \frac{-1.38830179169988389290633700561 \times 10^{-25}}{\left(-1.25078860197065733868689622897 \times 10^{-25}\right)} \text{ A.m}^2 \quad 316$$

The spin magnetic dipole moment of helium 5

Is given the spin magnetic dipole moment of electrons in normal helium 5 η_{seN} by

$$\eta_{seN} = \frac{-q \cdot h}{2 \cdot \pi \cdot m_e} \cdot \left(1 - \frac{\left(Q_{eN}^v\right)^2}{\left(l_{eN}^v\right)^4}\right) = \frac{-1.85671020595079339443322935783 \times 10^{-23}}{\left(-1.85474198821039190510541241979 \times 10^{-23}\right)} \text{ A.m}^2 \quad 317$$

Is given the spin magnetic dipole moment of the solitary electron in ionized helium 5 η_{seI} by

$$\eta_{seI} = \frac{-q \cdot h}{4 \cdot \pi \cdot m_e} \cdot \left(1 - \frac{\left(Q_{eI}^v\right)^2}{\left(l_{eI}^v\right)^4}\right) = \frac{-9.28185319332302068820245708881 \times 10^{-24}}{\left(-9.27201390442357292663561074720 \times 10^{-24}\right)} \text{ A.m}^2 \quad 318$$

Is given the spin magnetic dipole moment of the solitary proton orbital one η_{sp1} by

$$\eta_{sp1} = \frac{q \cdot h}{4 \cdot \pi \cdot m_p} \cdot \left(1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right) = \frac{5.04795132408744075773163916416 \times 10^{-27}}{\left(5.03859840042097032204438264323 \times 10^{-27}\right)} \text{ A.m}^2 \quad 319$$

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

$$\eta_{sp2} = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right) = \frac{1.00959026481748815154632783283 \times 10^{-26}}{\left(1.00771968008419406440887652865 \times 10^{-26}\right)} \text{ A.m}^2 \quad 320$$

Is given the spin magnetic dipole moment of complete protonic orbital three η_{sp3} by

$$\eta_{sp3} = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(1 - \frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right) = \frac{1.00959026481748815154632783283 \times 10^{-26}}{\left(1.00771968008419406440887652865 \times 10^{-26}\right)} \text{ A.m}^2 \quad 321$$

Is given the spin magnetic dipole moment of the solitary negatron orbital one η_{sn1} by

$$\eta_{sn1} = \frac{-q \cdot h}{4 \cdot \pi \cdot m_n \cdot (299{,}792{,}458.)} \cdot \left(1 - \frac{1}{\left(Q_n^r\right)^2}\right) = \frac{-1.03173372500902706794939762061 \times 10^{-32}}{\left(-1.22188667351825110136268537180 \times 10^{-32}\right)} \text{ A.m}^2 \quad 322$$

Is given the spin magnetic dipole moment of the complete negatronic orbital two η_{sn2} by

$$\eta_{sn2} = \frac{-q \cdot h}{2 \cdot \pi \cdot m_n \cdot (299{,}792{,}458.)} \cdot \left(1 - \frac{1}{\left(Q_n^r\right)^2}\right) = \frac{-2.06346745001805413589879524122 \times 10^{-32}}{\left(-2.44377334703650220272537074361 \times 10^{-32}\right)} \text{ A.m}^2 \quad 323$$

The Helium family - Stability and Gyromagnetic ratios

Orbital: Gyromagnetic ratios and Landé factors of helium 5

Is given the gyromagnetic ratio γ_{OeN} and Landé factor g_{OeN} of the electronic orbital in normal helium 5 by

the resultant of the angular momentum is

$$\varphi_{OeN} = \sqrt{(\varphi_{oeN})^2 + (\varphi_{seN})^2} = \frac{2.966240138260584091399598722 05\times10^{-34}}{(2.96624013826058451904195233680\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 324$$

the resultant of the magnetic moment is

$$\eta_{OeN} = \sqrt{(\eta_{oeN})^2 + (\eta_{seN})^2} = \frac{2.61130953773649207167467490974\times10^{-23}}{(2.60854140206223319049159922395\times10^{-23})} \text{ A.m}^2 \quad 325$$

then

$$\gamma_{OeN} = \frac{\eta_{OeN}}{\varphi_{OeN}} = \frac{q}{2\cdot m_e} = \frac{8.80343268251967926025390625000\times10^{10}}{(8.79410054639707183837890625000\times10^{10})} \text{ Hz.T}^{-1} \quad 326$$

$$g_{OeN} = 2\cdot\frac{2\cdot m_e}{q}\cdot\gamma_{OeN} = 2\cdot\frac{2\cdot m_e}{q}\cdot\frac{q}{2\cdot m_e} = 2. \quad 327$$

Is given the gyromagnetic ratio γ_{OeI} and Landé factor g_{OeI} of the electronic orbital in ionized helium 5 by

the resultant of the angular momentum is

$$\varphi_{OeI} = \sqrt{(\varphi_{oeI})^2 + (\varphi_{seI})^2} = \frac{1.48747040667896940178952887123\times10^{-34}}{(1.48747040667896982943188248598\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 328$$

the resultant of the magnetic moment is

$$\eta_{OeI} = \sqrt{(\eta_{oeI})^2 + (\eta_{seI})^2} = \frac{1.30948455924384780515178522809\times10^{-23}}{(1.30809643161249996189594203957\times10^{-23})} \text{ A.m}^2 \quad 329$$

then

$$\gamma_{OeI} = \frac{\eta_{OeI}}{\varphi_{OeI}} = \frac{q}{2\cdot m_e} = \frac{8.80343268251967926025390625000\times10^{10}}{(8.79410054639707031250000000000\times10^{10})} \text{ Hz.T}^{-1} \quad 330$$

$$g_{OeI} = 2\cdot\frac{m_e}{q}\cdot\gamma_{OeI} = 2\cdot\frac{m_e}{q}\cdot\frac{q}{2\cdot m_e} = 1. \quad 331$$

Is given the gyromagnetic ratio γ_{O1p} and Landé factor g_{O1p} of the protonic orbital one by

the resultant of the angular momentum is

$$\varphi_{O1p} = \sqrt{(\varphi_{op1})^2 + (\varphi_{sp1})^2} = \frac{1.48293317151554593061633387293\times10^{-34}}{(1.46369301192715262487178748655\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 332$$

the resultant of the magnetic moment is

$$\eta_{O1p} = \sqrt{(\eta_{op1})^2 + (\eta_{sp1})^2} = \frac{7.11438820060627666308219175300\times10^{-27}}{(7.01023601694938331368757327830\times10^{-27})} \text{ A.m}^2 \quad 333$$

then

$$\gamma_{O1p} = \frac{\eta_{O1p}}{\varphi_{O1p}} = \frac{q}{2\cdot m_p} = \frac{4.79751099864832684397697448730\times10^{7}}{(4.78941687896661236882209777832\times10^{7})} \text{ Hz.T}^{-1} \quad 334$$

$$g_{O1p} = 2\cdot\frac{m_p}{q}\cdot\gamma_{O1p} = 2\cdot\frac{m_p}{q}\cdot\frac{q}{2\cdot m_p} = 1. \quad 335$$

Is given the gyromagnetic ratio γ_{O2p} and Landé factor g_{O2p} of the protonic orbital two by

the resultant of the angular momentum is

$$\varphi_{O2p} = \sqrt{(\varphi_{op2})^2 + (\varphi_{sp2})^2} = \frac{2.965866343031091861232667745 86\times10^{-34}}{(2.927386023854304822101221358 36\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 336$$

the resultant of the magnetic moment is

$$\eta_{O2p} = \sqrt{(\eta_{op2})^2 + (\eta_{sp2})^2} = \frac{1.422877640121255332616438350 60\times10^{-26}}{(1.402047203389876662737514655 66\times10^{-26})} \text{ A.m}^2 \quad 337$$

then

$$\gamma_{O2p} = \frac{\eta_{O2p}}{\varphi_{O2p}} = \frac{q}{2\cdot m_p} = \frac{4.797510998648326843976974487 30\times10^{7}}{(4.789416878966612368822097778 32\times10^{7})} \text{ Hz.T}^{-1} \quad 338$$

$$g_{O2p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\gamma_{O2p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\frac{q}{2\cdot m_p} = 2. \quad 339$$

Is given the gyromagnetic ratio γ_{O3p} and Landé factor g_{O3p} of the protonic orbital three by

the resultant of the angular momentum is

$$\varphi_{O3p} = \sqrt{(\varphi_{op3})^2 + (\varphi_{sp3})^2} = \frac{2.965866343031091861232667745 86\times10^{-34}}{(2.927386023854304822101221358 36\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 340$$

the resultant of the magnetic moment is

$$\eta_{O3p} = \sqrt{(\eta_{op3})^2 + (\eta_{sp3})^2} = \frac{1.422877640121255332616438350 60\times10^{-26}}{(1.402047203389876662737514655 66\times10^{-26})} \text{ A.m}^2 \quad 341$$

then

$$\gamma_{O3p} = \frac{\eta_{O3p}}{\varphi_{O3p}} = \frac{q}{2\cdot m_p} = \frac{4.797510998648326843976974487 30\times10^{7}}{(4.789416878966612368822097778 32\times10^{7})} \text{ Hz.T}^{-1} \quad 342$$

$$g_{O3p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\gamma_{O3p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\frac{q}{2\cdot m_p} = 2. \quad 343$$

Is given, considering the displacement of the planes of protonic orbit in 60 degrees, the gyromagnetic ratio γ_{Op} and Landé factor g_{Op} of the protonic total by

being $\quad Sin[60^\circ] = Cos[30^\circ] = \frac{\sqrt{3}}{2} \quad$ and $\quad Sin[30^\circ] = Cos[60^\circ] = \frac{1}{2}$

then the resultant of the angular momentum is

$$\varphi_{Op} = \sqrt{\begin{gathered}\left(\varphi_{op1} + \frac{1}{2}\varphi_{op2} + \frac{\sqrt{3}}{2}\varphi_{sp2} - \frac{1}{2}\varphi_{op3} + \frac{\sqrt{3}}{2}\varphi_{sp3}\right)^2 + \\ + \left(\varphi_{sp1} - \frac{\sqrt{3}}{2}\varphi_{op2} + \frac{1}{2}\varphi_{sp2} - \frac{\sqrt{3}}{2}\varphi_{op3} - \frac{1}{2}\varphi_{sp3}\right)^2\end{gathered}} =$$

$$= \frac{5.346791587985735735791451564 75\times10^{-34}}{(5.277420206041672229227697387 73\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 344$$

the resultant of the magnetic moment is

$$\eta_{Op} = \sqrt{\begin{gathered}\left(\eta_{op1} + \frac{1}{2}\eta_{op2} + \frac{\sqrt{3}}{2}\eta_{sp2} - \frac{\sqrt{3}}{2}\eta_{op3} + \frac{1}{2}\eta_{sp3}\right)^2 + \\ + \left(\eta_{sp1} - \frac{\sqrt{3}}{2}\eta_{op2} + \frac{1}{2}\eta_{sp2} - \frac{1}{2}\eta_{op3} - \frac{\sqrt{3}}{2}\eta_{sp3}\right)^2\end{gathered}} =$$

$$= \frac{1.953012738095829072189209818 54\times10^{-26}}{(1.924421306809429100789034017 81\times10^{-26})} \text{ A.m}^2 \quad 345$$

then

$$\gamma_{Op} = \frac{\eta_{Op}}{\varphi_{Op}} = \frac{3.6526816240308620035648345947\,3\times 10^{7}}{(3.6465190029899872839450836181\,6\times 10^{7})}\ \text{Hz.T}^{-1} \qquad 346$$

$$\boldsymbol{g}_{Op} = 2\cdot\frac{5\cdot \boldsymbol{m}_p}{\boldsymbol{q}}\cdot\gamma_{Op} = \frac{3.806850703479351949454212444\,83}{(3.806850703479352837632632144\,96)} \qquad 347$$

Is given the gyromagnetic ratio γ_{On} and Landé factor $\boldsymbol{g}_{On}$ of the negatronic orbital by

the resultant of the angular momentum is

$$\varphi_{On} = \sqrt{(\varphi_{on1}+\varphi_{sn2})^2 + (\varphi_{on2}-\varphi_{sn1})^2} =$$

$$= \frac{5.2894205444822319778895368425\,7\times 10^{-36}}{(4.0247310488770989277322244087\,4\times 10^{-36})}\ \text{kg.m}^2.\text{s}^{-1} \qquad 348$$

the resultant of the magnetic moment is

$$\eta_{On} = \sqrt{(\eta_{on1}+\eta_{sn2})^2 + (\eta_{sn1}-\eta_{on2})^2} =$$

$$= \frac{1.5521685897628640089674084790\,9\times 10^{-25}}{(1.3984241697441853428888659968\,2\times 10^{-25})}\ \text{A.m}^2 \qquad 349$$

then

$$\gamma_{On} = \frac{\eta_{On}}{\varphi_{On}} = \frac{\boldsymbol{q}}{2\cdot\boldsymbol{m}_n} = \frac{2.9344775608398929595947265625\,0\times 10^{10}}{(3.4745779351749382019042968750\,0\times 10^{10})}\ \text{Hz.T}^{-1} \qquad 350$$

$$\boldsymbol{g}_{On} = 2\cdot\frac{3\cdot\boldsymbol{m}_n}{\boldsymbol{q}}\cdot\gamma_{On} = 2\cdot\frac{3\cdot\boldsymbol{m}_n}{\boldsymbol{q}}\cdot\frac{\boldsymbol{q}}{2\cdot\boldsymbol{m}_n} = 3. \qquad 351$$

Nucleus: Gyromagnetic ratios and Landé factors of helium 5

Is given, considering the displacement of the planes of protonic orbit in 60 degrees, the gyromagnetic ratio γ_N and Landé factor $\boldsymbol{g}_N$ of nucleus by

the resultant of the angular momentum is

$$\varphi_N = \sqrt{\begin{aligned}&\left(\varphi_{op1} + \frac{1}{2}\varphi_{op2} + \frac{\sqrt{3}}{2}\varphi_{sp2} - \frac{1}{2}\varphi_{op3} + \frac{\sqrt{3}}{2}\varphi_{sp3} - \varphi_{on1} - \varphi_{sn2}\right)^2 + \\ &+\left(\varphi_{sp1} - \frac{\sqrt{3}}{2}\varphi_{op2} + \frac{1}{2}\varphi_{sp2} - \frac{\sqrt{3}}{2}\varphi_{op3} - \frac{1}{2}\varphi_{sp3} + \varphi_{on2} - \varphi_{sn1}\right)^2\end{aligned}} = \frac{5.3034087837995466829666472310 5\times 10^{-34}}{(5.2447015291863374484095173264 4\times 10^{-34})} \text{kg.m}^2.\text{s}^{-1} \quad 352$$

the resultant of the magnetic moment is

$$\eta_N = \sqrt{\begin{aligned}&\left(\eta_{op1} + \frac{1}{2}\eta_{op2} + \frac{\sqrt{3}}{2}\eta_{sp2} - \frac{\sqrt{3}}{2}\eta_{op3} + \frac{1}{2}\eta_{sp3} + \eta_{on1} + \eta_{sn2}\right)^2 + \\ &+\left(\eta_{sp1} - \frac{\sqrt{3}}{2}\eta_{op2} + \frac{1}{2}\eta_{sp2} - \frac{1}{2}\eta_{op3} - \frac{\sqrt{3}}{2}\eta_{sp3} + \eta_{sn1} - \eta_{on2}\right)^2\end{aligned}} = \frac{1.73211534000459411180545400355\times 10^{-25}}{(1.57495286153276146161736065823\times 10^{-25})} \text{A.m}^2 \quad 353$$

then

$$\gamma_N = \frac{\eta_N}{\varphi_N} = \frac{3.26604154161325335502624511719\times 10^{8}}{(3.00294087808100581169128417969\times 10^{8})} \text{Hz.T}^{-1} \quad 354$$

$$\boldsymbol{g}_N = 2\cdot\frac{5\cdot \boldsymbol{m}_p + 3\cdot \boldsymbol{m}_n}{\boldsymbol{q}}\cdot\gamma_N = \frac{34.0723063376580412864313984755}{(31.3756824334764168327183142537)} \quad 355$$

Atom: Gyromagnetic ratios and Landé factors of normal helium 5

Is given, considering the displacement of the planes of protonic orbit in 60 degrees, the gyromagnetic ratio γ_{TN} and Landé factor $\boldsymbol{g}_{TN}$ of normal helium 5 atom by

the resultant of the angular momentum is

$$\varphi_{TN} = \sqrt{\begin{aligned}&\left(\varphi_{op1} + \frac{1}{2}\varphi_{op2} + \frac{\sqrt{3}}{2}\varphi_{sp2} - \frac{1}{2}\varphi_{op3} + \frac{\sqrt{3}}{2}\varphi_{sp3} - \varphi_{on1} - \varphi_{sn2} - \varphi_{seN}\right)^2 + \\ &+\left(\varphi_{sp1} - \frac{\sqrt{3}}{2}\varphi_{op2} + \frac{1}{2}\varphi_{sp2} - \frac{\sqrt{3}}{2}\varphi_{op3} - \frac{1}{2}\varphi_{sp3} + \varphi_{on2} - \varphi_{sn1} + \varphi_{oeN}\right)^2\end{aligned}} = \frac{2.59384434885873691675961306649\times 10^{-34}}{(2.55917167956004836349653338421\times 10^{-34})} \text{kg.m}^2.\text{s}^{-1} \quad 356$$

the resultant of the magnetic moment is

$$\eta_{TN} = \sqrt{\begin{aligned}&\left(\eta_{op1} + \frac{1}{2}\eta_{op2} + \frac{\sqrt{3}}{2}\eta_{sp2} - \frac{\sqrt{3}}{2}\eta_{op3} + \frac{1}{2}\eta_{sp3} + \eta_{on1} + \eta_{sn2} + \eta_{seN}\right)^2 + \\ &+\left(\eta_{sp1} - \frac{\sqrt{3}}{2}\eta_{op2} + \frac{1}{2}\eta_{sp2} - \frac{1}{2}\eta_{op3} - \frac{\sqrt{3}}{2}\eta_{sp3} + \eta_{sn1} - \eta_{on2} - \eta_{oeN}\right)^2\end{aligned}} = \frac{2.62795566594472764114668568560\times 10^{-23}}{(2.62369977572058776609858570114\times 10^{-23})} \text{A.m}^2 \quad 357$$

then

$$\gamma_{TN} = \frac{\eta_{TN}}{\varphi_{TN}} = \frac{1.01315087279658828735351562500 \times 10^{11}}{(1.02521444601623306274414062500 \times 10^{11})} \text{ Hz.T}^{-1} \quad 358$$

$$g_{TN} = 2 \cdot \frac{5 \cdot m_p + 3 \cdot m_n + 2 \cdot m_e}{q} \cdot \gamma_{TN} = \frac{10571.7897246937409363454207778}{(10714.0985571670316858217120171)} \quad 359$$

Atom: Gyromagnetic ratios and Landé factors of ionized helium 5

Is given, considering the displacement of the planes of protonic orbit in 60 degrees, the gyromagnetic ratio γ_{TI} and Landé factor g_{TI} of ionized helium 5 atom by

the resultant of the angular momentum is

$$\varphi_{TI} = \sqrt{\begin{aligned}&\left(\varphi_{op1} + \frac{1}{2}\varphi_{op2} + \frac{\sqrt{3}}{2}\varphi_{sp2} - \frac{1}{2}\varphi_{op3} + \frac{\sqrt{3}}{2}\varphi_{sp3} - \varphi_{on1} - \varphi_{sn2} - \varphi_{seI}\right)^2 + \\ &+\left(\varphi_{sp1} - \frac{\sqrt{3}}{2}\varphi_{op2} + \frac{1}{2}\varphi_{sp2} - \frac{\sqrt{3}}{2}\varphi_{op3} - \frac{1}{2}\varphi_{sp3} + \varphi_{on2} - \varphi_{sn1} + \varphi_{oeI}\right)^2\end{aligned}} =$$

$$= \frac{3.90000613519575745699383657893 \times 10^{-34}}{(3.84865413202548964476876309725 \times 10^{-34})} \text{ kg.m}^2\text{.s}^{-1} \quad 360$$

the resultant of the magnetic moment is

$$\eta_{TI} = \sqrt{\begin{aligned}&\left(\eta_{op1} + \frac{1}{2}\eta_{op2} + \frac{\sqrt{3}}{2}\eta_{sp2} - \frac{\sqrt{3}}{2}\eta_{op3} + \frac{1}{2}\eta_{sp3} + \eta_{on1} + \eta_{sn2} + \eta_{seI}\right)^2 + \\ &+\left(\eta_{sp1} - \frac{\sqrt{3}}{2}\eta_{op2} + \frac{1}{2}\eta_{sp2} - \frac{1}{2}\eta_{op3} - \frac{\sqrt{3}}{2}\eta_{sp3} + \eta_{sn1} - \eta_{on2} - \eta_{oeI}\right)^2\end{aligned}} =$$

$$= \frac{1.32614979503532764738651248547 \times 10^{-23}}{(1.32327146628293415326866482862 \times 10^{-23})} \text{ A.m}^2 \quad 361$$

then

$$\gamma_{TI} = \frac{\eta_{TI}}{\varphi_{TI}} = \frac{3.40037874060616760253906250000 \times 10^{10}}{(3.43827068083801879882812500000 \times 10^{10})} \text{ Hz.T}^{-1} \quad 362$$

$$g_{TI} = 2 \cdot \frac{5 \cdot m_p + 3 \cdot m_n + m_e}{q} \cdot \gamma_{TI} = \frac{3548.14766440266157587757334113}{(3593.19663157897366545512340963)} \quad 363$$

Summary of helium 5

First part - Calculations performed according to NIST constants

Table 1: The orbital gyromagnetic ratios and Landé factor of helium 5.

Particle in orbit		Gyromagnetic ratio $Hz.T^{-1}$	Landé factor
Electrons	normal	$8.7941005463970718383789062500 \times 10^{10}$	2.
Electrons	ionized	$8.7941005463970703125000000000 \times 10^{10}$	1.
Protons	Orbital 1	$4.78941687896661236882209777832 \times 10^{7}$	1.
Protons	Orbital 2	$4.78941687896661236882209777832 \times 10^{7}$	2.
Protons	Orbital 3	$4.78941687896661236882209777832 \times 10^{7}$	2.
Protons	Total	$3.64651900298998728394508361816 \times 10^{7}$	3.8068507
Negatrons	Orbital 1	$3.47457793517493820190429687500 \times 10^{10}$	1.
Negatrons	Orbital 2	$3.47457793517493820190429687500 \times 10^{10}$	2.
Negatrons	Total	$3.47457793517493820190429687500 \times 10^{10}$	3.

Table 2: The nuclear gyromagnetic ratios and Landé factor of helium 5.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$3.00294087808100581169128417969 \times 10^{8}$	$Hz.T^{-1}$
Landé factor	31.3756824334764168327183142537	Dimensionless

Table 3: The atomic gyromagnetic ratios and Landé factor of the normal helium 5.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$1.02521444601623306274414062500 \times 10^{11}$	$Hz.T^{-1}$
Landé factor	10714.0985571670316858217120171	Dimensionless

Table 4: The atomic gyromagnetic ratios and Landé factor of the ionized helium 5.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$3.43827068083801879882812500000 \times 10^{10}$	$Hz.T^{-1}$
Landé factor	3593.19663157897366545512340963	Dimensionless

The Helium family - Stability and Gyromagnetic ratios

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

Table 5: The orbital gyromagnetic ratios and Landé factor of helium 5.

Particle in orbit		Gyromagnetic ratio Hz.T^{-1}	Landé factor
Electrons	normal	$8.8034326825196792602539062500\times10^{10}$	2.
Electrons	ionized	$8.8034326825196792602539062500\times10^{10}$	1.
Protons	Orbital 1	$4.7975109986483268439769744873\times10^{7}$	1.
Protons	Orbital 2	$4.7975109986483268439769744873\times10^{7}$	2.
Protons	Orbital 3	$4.7975109986483268439769744873\times10^{7}$	2.
Protons	Total	$3.6526816240308620035648345947\times10^{7}$	3.8068507
Negatrons	Orbital 1	$2.9344775608398929595947265625\times10^{10}$	1.
Negatrons	Orbital 2	$2.9344775608398925781250000000\times10^{10}$	2.
Negatrons	Total	$2.9344775608398929595947265625\times10^{10}$	3.

Table 6: The nuclear gyromagnetic ratios and Landé factor of helium 5.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$3.2660415416132533550262451172\times10^{8}$	Hz.T^{-1}
Landé factor	34.072306337658041286431398475	Dimensionless

Table 7: The atomic gyromagnetic ratios and Landé factor of the normal helium 5.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$1.0131508727965882873535156250\times10^{11}$	Hz.T^{-1}
Landé factor	10571.789724693740936345420778	Dimensionless

Table 8: The atomic gyromagnetic ratios and Landé factor of the ionized helium 5.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$3.4003787406061676025390625000\times10^{10}$	Hz.T^{-1}
Landé factor	3548.1476644026615758775733411	Dimensionless

GYROMAGNETIC RATIOS of HELIUM 6

Mendoza - Argentina Credit: Fernando Bowen Mendoza, Argentina (STOCKXPERT 364218)

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Initial note on gyromagnetic ratios of helium 6

This publication correct and update the magnitudes given to helium 6 ^{6}He 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 *"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 helium 6

To be able to work with the angular and magnetic moments, we need to know before the orbit radius of magnitudes and the medium tangential speeds of all helium 6 particles. Then, there is a concise of these summarized magnitudes.

Is established the quantum state of the electrons in normal (letter "N" as right subindex in the variable) helium 6 by following relationship

$$Q_{eN}^{v} = \frac{2\cdot\pi\cdot c\cdot m_e\cdot r_{eN}}{h} = \frac{174.02708644549156247194332536 3}{(174.027086445491562471943325363)} \quad \therefore \quad l_{eN}^{v} = \frac{175.}{(175.)} \qquad 364$$

where Q_{eN}^{v} is the quantum vectorial number calculated for electrons, c is the speed of the light, m_e is the inertial mass of electron, r_{eN} is the orbit radius of electrons (according to expression number **5** and **6**), h is the constant of Planck and l_{eN}^{v} is the quantum state of the electrons (the bigger integer most closely whereby the value has been calculated).

Is established the quantum state of the electrons in ionized (letter "I" as right subindex in the variable) helium 6 by following relationship

$$Q_{eI}^{v} = \frac{2\cdot\pi\cdot c\cdot m_e\cdot r_{eI}}{h} = \frac{67.8282051505025407323046238162}{(67.8282051505025407323046238162)} \quad \therefore \quad l_{eI}^{v} = \frac{68.}{(68.)} \qquad 365$$

where Q_{eI}^{v} is the quantum vectorial number calculated for electron, r_{eI} is the orbit radius of electron (according to expression number **12** and **13**) and l_{eI}^{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 in helium 6 by following relationship

$$Q_{p}^{v} = \frac{2\cdot\pi\cdot c\cdot m_p\cdot r_{p}}{h} = \frac{17.3160236081053966472609317861}{(17.9702066560284627882992936065)} \quad \therefore \quad l_{p}^{v} = \frac{18.}{(18.)} \qquad 366$$

where Q_{p}^{v} is the quantum vectorial number calculated for protons, m_p is the inertial mass of proton, r_p is the orbit radius of protons (according to expression number **105** and **106**) 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 negatron in helium 6 by following relationship

$$Q_{n}^{r} = \frac{h}{2\cdot\pi\cdot c\cdot m_n\cdot r_{n}} = \frac{54.8352981761790729819949774537}{(64.0150962543579566954576876014)} \quad \therefore \quad l_{n}^{r} = \frac{54.}{(64.)} \qquad 367$$

where Q_{n}^{r} is the quantum radial number calculated for negatron, m_n is the inertial mass of negatron, r_n is the orbit radius of negatrons (according to expression number **107** and **108**)

The Helium family - Stability and Gyromagnetic ratios

and l_n^r is the quantum state of the negatrons (the smallest integer most closely whereby the value has been calculated).

Is given the radius of orbits to (according to expression number **364**, **365**, **366** and **367**)

electrons (normal) $$r_{eN} = \frac{h \cdot Q_{eN}^v}{2 \cdot \pi \cdot c \cdot m_e} = \frac{6.7273485508664138305744853917 4\times 10^{-11}}{(6.72021718124220342261284778486 \times 10^{-11})}$$ meter 368

electrons (ionized) $$r_{el} = \frac{h \cdot Q_{el}^v}{2 \cdot \pi \cdot c \cdot m_e} = \frac{2.62202848388216708327694153221 \times 10^{-11}}{(2.61924898551927037597275612172 \times 10^{-11})}$$ meter 369

proton $$r_p = \frac{h \cdot Q_p^v}{2 \cdot \pi \cdot c \cdot m_p} = \frac{3.64786855513111892646153181798 \times 10^{-15}}{(3.77929457835508428268999414128 \times 10^{-15})}$$ meter 370

negatron $$r_n = \frac{h}{2 \cdot \pi \cdot c \cdot m_n \cdot Q_n^r} = \frac{2.34987962749884014403996274191 \times 10^{-15}}{(2.38338766361842954265243935002 \times 10^{-15})}$$ meter 371

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

electrons (normal) $$r_{seN} = \frac{h}{2 \cdot \pi \cdot c \cdot m_e} \sqrt{1 - \frac{(Q_{eN}^v)^2}{(l_{eN}^v)^4}} = \frac{3.86562808754964695726858698706 \times 10^{-13}}{(3.86153030333145070890139618987 \times 10^{-13})}$$ meter 372

electrons (ionized) $$r_{sel} = \frac{h}{2 \cdot \pi \cdot c \cdot m_e} \sqrt{1 - \frac{(Q_{el}^v)^2}{(l_{el}^v)^4}} = \frac{3.86527458573324325699659233331 \times 10^{-13}}{(3.86117717624694861817004497046 \times 10^{-13})}$$ meter 373

proton $$r_{sp} = \frac{h}{2 \cdot \pi \cdot c \cdot m_p} \sqrt{1 - \frac{(Q_p^v)^2}{(l_p^v)^4}} = \frac{2.10363255366364296384852843405 \times 10^{-16}}{(2.09985183778108830566677435267 \times 10^{-16})}$$ meter 374

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

$$= \frac{4.29747040415045465277607952758 \times 10^{-22}}{(5.08865949313241998942229784686 \times 10^{-22})}$$ meter 375

Is given the orbit medium tangential speed to

electrons (normal) $$v_{eN} = c \cdot \frac{Q_{eN}^v}{(l_{eN}^v)^2} = \frac{1.70357577156154741533100605011 \times 10^6}{(1.70357577156154741533100605011 \times 10^6)}$$ $m.s^{-1}$ 376

electrons (ionized) $$v_{el} = c \cdot \frac{Q_{el}^v}{(l_{el}^v)^2} = \frac{4.39757446881431993097066879272 \times 10^6}{(4.39757446881431993097066879272 \times 10^6)}$$ $m.s^{-1}$ 377

proton $$v_p = c \cdot \frac{Q_p^v}{(l_p^v)^2} = \frac{1.60222632106788437813520431519 \times 10^7}{(1.66275692104281876236200332642 \times 10^7)}$$ $m.s^{-1}$ 378

negatron $$v_n = c = 299,792,458.$$ $m.s^{-1}$ 379

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

electrons (normal) $$v_{seN} = c \cdot \sqrt{1 - \frac{(Q_{eN}^v)^2}{(l_{eN}^v)^4}} = \frac{2.99787617661691129207611083984 \times 10^8}{(2.99787617661691129207611083984 \times 10^8)}$$ $m.s^{-1}$ 380

electrons (ionized) $$v_{sel} = c \cdot \sqrt{1 - \frac{(Q_{el}^v)^2}{(l_{el}^v)^4}} = \frac{2.99760202849666178226470947266 \times 10^8}{(2.99760202849666178226470947266 \times 10^8)}$$ $m.s^{-1}$ 381

proton $$v_{sp} = c \cdot \sqrt{1 - \frac{(Q_p^v)^2}{(l_p^v)^4}} = \frac{2.99364000767108798027038574219 \times 10^8}{(2.99330990403322875499725341797 \times 10^8)}$$ $m.s^{-1}$ 382

negatron $$v_{sn} = c \cdot \sqrt{1 - \frac{1}{(Q_n^r)^2}} = \frac{2.99742603266268193721771240234 \times 10^8}{(2.99755877267406523227691650391 \times 10^8)}$$ $m.s^{-1}$ 383

The orbital angular momentum of helium 6

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 electrons in normal helium 6 φ_{oeN} by

$$\varphi_{oeN} = 2 \cdot m_e \cdot v_{eN} \cdot r_{eN} = \frac{2.0857569638674184625580502225 \times 10^{-34}}{(2.0857569638674188902004038370 \times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 384$$

Is given the orbital angular momentum of the solitary electron in ionized helium 6 φ_{oeI} by

$$\varphi_{oeI} = m_e \cdot v_{eI} \cdot r_{eI} = \frac{1.0492498844232812866287998471 4\times 10^{-34}}{(1.0492498844232817142711534618 9\times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 385$$

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

$$\varphi_{op1} = 2 \cdot m_p \cdot v_p \cdot r_p = \frac{1.9518993943373044058887913474 3\times 10^{-34}}{(2.1021670948278224704921841178 0\times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 386$$

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

$$\varphi_{op2} = 2 \cdot m_p \cdot v_p \cdot r_p = \frac{1.9518993943373044058887913474 3\times 10^{-34}}{(2.1021670948278224704921841178 0\times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 387$$

Is given the orbital angular momentum of the complete protonic orbital three φ_{op3} by

$$\varphi_{op3} = 2 \cdot m_p \cdot v_p \cdot r_p = \frac{1.9518993943373044058887913474 3\times 10^{-34}}{(2.1021670948278224704921841178 0\times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 388$$

Is given the orbital angular momentum of the solitary negatron orbital one φ_{on1} by

$$\varphi_{on1} = 2 \cdot m_n \cdot v_n \cdot r_n = \frac{3.8463242379981074011372194402 1\times 10^{-36}}{(3.2947593429344030495390754343 1\times 10^{-36})} \text{ kg.m}^2.\text{s}^{-1} \quad 389$$

Is given the orbital angular momentum of the complete negatronic orbital two φ_{on2} by

$$\varphi_{on2} = 2 \cdot m_n \cdot v_n \cdot r_n = \frac{3.8463242379981074011372194402 1\times 10^{-36}}{(3.2947593429344030495390754343 1\times 10^{-36})} \text{ kg.m}^2.\text{s}^{-1} \quad 390$$

The spin angular momentum of helium 6

Is given the spin angular momentum of electrons in normal helium 6 φ_{seN} by

$$\varphi_{seN} = 2 \cdot m_e \cdot v_{seN} \cdot r_{seN} = \frac{2.1090752583790692786553309788 6\times 10^{-34}}{(2.1090752583790697062976845936 1\times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 391$$

Is given the spin angular momentum of the solitary electron in ionized helium 6 φ_{seI} by

$$\varphi_{seI} = m_e \cdot v_{seI} \cdot r_{seI} = \frac{1.0543447684621143632171641193 8\times 10^{-34}}{(1.0543447684621145770383409267 6\times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 392$$

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

$$\varphi_{sp1} = 2 \cdot m_p \cdot v_{sp} \cdot r_{sp} = \frac{2.1031189838821905068477283920 0\times 10^{-34}}{(2.1026551946831451000989951196 1\times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 393$$

The Helium family - Stability and Gyromagnetic ratios

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

$$\varphi_{sp2} = 2 \cdot m_p \cdot v_{sp} \cdot r_{sp} = \frac{2.103118983882190506847728392 00 \times 10^{-34}}{(2.1026551946831451000989951196 1\times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 394$$

Is given the spin angular momentum of the complete protonic orbital three φ_{sp3} by

$$\varphi_{sp3} = 2 \cdot m_p \cdot v_{sp} \cdot r_{sp} = \frac{2.103118983882190506847728392 00 \times 10^{-34}}{(2.1026551946831451000989951196 1\times 10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 395$$

Is given the spin angular momentum of the solitary negatron orbital one φ_{sn1} by

$$\varphi_{sn1} = 2 \cdot m_n \cdot v_{sn} \cdot r_{sn} = \frac{7.0330052551071441501647174510 4\times 10^{-43}}{(7.0336281774803210647333849521 7\times 10^{-43})} \text{ kg.m}^2.\text{s}^{-1} \quad 396$$

Is given the spin angular momentum of the complete negatronic orbital two φ_{sn2} by

$$\varphi_{sn2} = 2 \cdot m_n \cdot v_{sn} \cdot r_{sn} = \frac{7.0330052551071441501647174510 4\times 10^{-43}}{(7.0336281774803210647333849521 7\times 10^{-43})} \text{ kg.m}^2.\text{s}^{-1} \quad 397$$

The orbital magnetic dipole moment of helium 6

Regarding the calculation of magnetic dipole moments, see "*The Hydrogen family – Stability and gyromagnetic ratios*" in the section "*The magnetic dipole moment*" on page 25.

Is given the orbital magnetic dipole moment of electrons in normal helium 6 η_{oeN} by

$$\eta_{oeN} = \frac{-q \cdot h}{2 \cdot \pi \cdot m_e} \cdot \left(\frac{Q^v_{eN}}{l^v_{eN}}\right)^2 = \frac{-1.8361821023503453482585815410 9\times 10^{-23}}{(-1.8342356455597964866284314797 9\times 10^{-23})} \text{ A.m}^2 \quad 398$$

Is given the orbital magnetic dipole moment of the solitary electron in ionized helium 6 η_{oeI} by

$$\eta_{oeI} = \frac{-q \cdot h}{4 \cdot \pi \cdot m_e} \cdot \left(\frac{Q^v_{eI}}{l^v_{eI}}\right)^2 = \frac{-9.2370007246619128233632307152 1\times 10^{-24}}{(-9.2272089819138448630065496069 7\times 10^{-24})} \text{ A.m}^2 \quad 399$$

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

$$\eta_{op1} = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(\frac{Q^v_p}{l^v_p}\right)^2 = \frac{9.3642588125882262085074786169 4\times 10^{-27}}{(1.0068154566376583026798370675 3\times 10^{-26})} \text{ A.m}^2 \quad 400$$

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

$$\eta_{op2} = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(\frac{Q^v_p}{l^v_p}\right)^2 = \frac{9.3642588125882262085074786169 4\times 10^{-27}}{(1.0068154566376583026798370675 3\times 10^{-26})} \text{ A.m}^2 \quad 401$$

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

$$\eta_{op3} = \frac{q \cdot h}{2 \cdot \pi \cdot m_p} \cdot \left(\frac{Q^v_p}{l^v_p}\right)^2 = \frac{9.3642588125882262085074786169 4\times 10^{-27}}{(1.0068154566376583026798370675 3\times 10^{-26})} \text{ A.m}^2 \quad 402$$

Is given the orbital magnetic dipole moment of the solitary negatron orbital one η_{on1} by

$$\eta_{on1} = \frac{-q \cdot h}{2 \cdot \pi \cdot m_n} \cdot \frac{1}{(Q^r_n)^2} = \frac{-1.1286952168120044881658431977 6\times 10^{-25}}{(-1.1447898114671358110838151444 1\times 10^{-25})} \text{ A.m}^2 \quad 403$$

Is given the orbital magnetic dipole moment of the complete negatronic orbital two η_{on2} by

$$\eta_{on2} = \frac{-q\cdot h}{2\cdot\pi\cdot m_n}\cdot\frac{1}{\left(Q_n^r\right)^2} = \frac{-1.12869521681200448816584319776\times10^{-25}}{\left(-1.14478981146713581108381514441\times10^{-25}\right)}\ \text{A.m}^2 \quad 404$$

The spin magnetic dipole moment of helium 6

Is given the spin magnetic dipole moment of electrons in normal helium 6 η_{seN} by

$$\eta_{seN} = \frac{-q\cdot h}{2\cdot\pi\cdot m_e}\cdot\left(1-\frac{\left(Q_{eN}^v\right)^2}{\left(l_{eN}^v\right)^4}\right) = \frac{-1.85671020595079339443322935783\times10^{-23}}{\left(-1.85474198821039190510541241979\times10^{-23}\right)}\ \text{A.m}^2 \quad 405$$

Is given the spin magnetic dipole moment of the solitary electron in ionized helium 6 η_{seI} by

$$\eta_{seI} = \frac{-q\cdot h}{4\cdot\pi\cdot m_e}\cdot\left(1-\frac{\left(Q_{eI}^v\right)^2}{\left(l_{eI}^v\right)^4}\right) = \frac{-9.28185319332302068820245708881\times10^{-24}}{\left(-9.27201390442357292663561074720\times10^{-24}\right)}\ \text{A.m}^2 \quad 406$$

Is given the spin magnetic dipole moment of the solitary proton orbital one η_{sp1} by

$$\eta_{sp1} = \frac{q\cdot h}{2\cdot\pi\cdot m_p}\cdot\left(1-\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right) = \frac{1.00897364566408993927876247945\times10^{-26}}{\left(1.00704922800622840311931244569\times10^{-26}\right)}\ \text{A.m}^2 \quad 407$$

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

$$\eta_{sp2} = \frac{q\cdot h}{2\cdot\pi\cdot m_p}\cdot\left(1-\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right) = \frac{1.00897364566408993927876247945\times10^{-26}}{\left(1.00704922800622840311931244569\times10^{-26}\right)}\ \text{A.m}^2 \quad 408$$

Is given the spin magnetic dipole moment of complete protonic orbital three η_{sp3} by

$$\eta_{sp3} = \frac{q\cdot h}{2\cdot\pi\cdot m_p}\cdot\left(1-\frac{\left(Q_p^v\right)^2}{\left(l_p^v\right)^4}\right) = \frac{1.00897364566408993927876247945\times10^{-26}}{\left(1.00704922800622840311931244569\times10^{-26}\right)}\ \text{A.m}^2 \quad 409$$

Is given the spin magnetic dipole moment of the solitary negatron orbital one η_{sn1} by

$$\eta_{sn1} = \frac{-q\cdot h}{2\cdot\pi\cdot m_n\cdot(299,792,458.)}\cdot\left(1-\frac{1}{\left(Q_n^r\right)^2}\right) = \frac{-2.06381961063809555499927338551\times10^{-32}}{\left(-2.44388892696978431253035015649\times10^{-32}\right)}\ \text{A.m}^2 \quad 410$$

Is given the spin magnetic dipole moment of the complete negatronic orbital two η_{sn2} by

$$\eta_{sn2} = \frac{-q\cdot h}{2\cdot\pi\cdot m_n\cdot(299,792,458.)}\cdot\left(1-\frac{1}{\left(Q_n^r\right)^2}\right) = \frac{-2.06381961063809555499927338551\times10^{-32}}{\left(-2.44388892696978431253035015649\times10^{-32}\right)}\ \text{A.m}^2 \quad 411$$

The Helium family - Stability and Gyromagnetic ratios

Orbital: Gyromagnetic ratios and Landé factors of helium 6

Is given the gyromagnetic ratio γ_{OeN} and Landé factor g_{OeN} of the electronic orbital in normal helium 6 by

the resultant of the angular momentum is

$$\varphi_{OeN} = \sqrt{(\varphi_{oeN})^2 + (\varphi_{seN})^2} = \frac{2.96624013826058409139959872205\times10^{-34}}{(2.966240138260584519041952336 80\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 412$$

the resultant of the magnetic moment is

$$\eta_{OeN} = -\sqrt{(\eta_{oeN})^2 + (\eta_{seN})^2} = \frac{-2.611309537736492071674674909 74\times10^{-23}}{(-2.608541402062233190491599223 95\times10^{-23})} \text{ A.m}^2 \quad 413$$

then

$$\gamma_{OeN} = \frac{\eta_{OeN}}{\varphi_{OeN}} = \frac{-q}{2\cdot m_e} = \frac{-8.803432682519679260253906250 00\times10^{10}}{(-8.794100546397071838378906250 00\times10^{10})} \text{ Hz.T}^{-1} \quad 414$$

$$g_{OeN} = 2\cdot\frac{2\cdot m_e}{-q}\cdot\gamma_{OeN} = 2\cdot\frac{2\cdot m_e}{-q}\cdot\frac{-q}{2\cdot m_e} = 2. \quad 415$$

Is given the gyromagnetic ratio γ_{OeI} and Landé factor g_{OeI} of the electronic orbital in ionized helium 6 by

the resultant of the angular momentum is

$$\varphi_{OeI} = \sqrt{(\varphi_{oeI})^2 + (\varphi_{seI})^2} = \frac{1.487470406678969401789528871 23\times10^{-34}}{(1.487470406678969829431882485 98\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 416$$

the resultant of the magnetic moment is

$$\eta_{OeI} = \sqrt{(\eta_{oeI})^2 + (\eta_{seI})^2} = \frac{1.309484559243847805151785228 09\times10^{-23}}{(1.308096431612499961895942039 57\times10^{-23})} \text{ A.m}^2 \quad 417$$

then

$$\gamma_{OeI} = \frac{\eta_{OeI}}{\varphi_{OeI}} = \frac{q}{2\cdot m_e} = \frac{8.803432682519679260253906250 00\times10^{10}}{(8.794100546397070312500000000 00\times10^{10})} \text{ Hz.T}^{-1} \quad 418$$

$$g_{OeI} = 2\cdot\frac{m_e}{q}\cdot\gamma_{OeI} = 2\cdot\frac{m_e}{q}\cdot\frac{q}{2\cdot m_e} = 1. \quad 419$$

Is given the gyromagnetic ratio γ_{O1p} and Landé factor g_{O1p} of the protonic orbital one by

the resultant of the angular momentum is

$$\varphi_{O1p} = \sqrt{(\varphi_{op1})^2 + (\varphi_{sp1})^2} = \frac{2.869324085212403211924077599 29\times10^{-34}}{(2.973258374629568240614656982 04\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 420$$

the resultant of the magnetic moment is

$$\eta_{O1p} = \sqrt{(\eta_{op1})^2 + (\eta_{sp1})^2} = \frac{1.376561385749305034186729872 36\times10^{-26}}{(1.424017384497969323053480263 18\times10^{-26})} \text{ A.m}^2 \quad 421$$

then

$$\gamma_{O1p} = \frac{\eta_{O1p}}{\varphi_{O1p}} = \frac{q}{2\cdot m_p} = \frac{4.797510998648325353860855102 54\times10^{7}}{(4.789416878966613858938217163 09\times10^{7})} \text{ Hz.T}^{-1} \quad 422$$

$$g_{O1p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\gamma_{O1p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\frac{q}{2\cdot m_p} = 2. \quad 423$$

Is given the gyromagnetic ratio γ_{O2p} and Landé factor g_{O2p} of the protonic orbital two by

the resultant of the angular momentum is

$$\varphi_{O2p} = \sqrt{(\varphi_{op2})^2 + (\varphi_{sp2})^2} = \frac{2.86932408521240321192407759929\times10^{-34}}{(2.97325837462956824061465698204\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 424$$

the resultant of the magnetic moment is

$$\eta_{O2p} = \sqrt{(\eta_{op2})^2 + (\eta_{sp2})^2} = \frac{1.37656138574930503418672987236\times10^{-26}}{(1.42401738449796932305348026318\times10^{-26})} \text{ A.m}^2 \quad 425$$

then

$$\gamma_{O2p} = \frac{\eta_{O2p}}{\varphi_{O2p}} = \frac{q}{2\cdot m_p} = \frac{4.79751099864832535386085510254\times10^{7}}{(4.78941687896661385893821716309\times10^{7})} \text{ Hz.T}^{-1} \quad 426$$

$$g_{O2p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\gamma_{O2p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\frac{q}{2\cdot m_p} = 2. \quad 427$$

Is given the gyromagnetic ratio γ_{O3p} and Landé factor g_{O3p} of the protonic orbital three by

the resultant of the angular momentum is

$$\varphi_{O3p} = \sqrt{(\varphi_{op3})^2 + (\varphi_{sp3})^2} = \frac{2.86932408521240321192407759929\times10^{-34}}{(2.97325837462956824061465698204\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 428$$

the resultant of the magnetic moment is

$$\eta_{O3p} = \sqrt{(\eta_{op3})^2 + (\eta_{sp3})^2} = \frac{1.37656138574930503418672987236\times10^{-26}}{(1.42401738449796932305348026318\times10^{-26})} \text{ A.m}^2 \quad 429$$

then

$$\gamma_{O3p} = \frac{\eta_{O3p}}{\varphi_{O3p}} = \frac{q}{2\cdot m_p} = \frac{4.79751099864832535386085510254\times10^{7}}{(4.78941687896661385893821716309\times10^{7})} \text{ Hz.T}^{-1} \quad 430$$

$$g_{O3p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\gamma_{O3p} = 2\cdot\frac{2\cdot m_p}{q}\cdot\frac{q}{2\cdot m_p} = 2. \quad 431$$

Is given, considering the displacement of the planes of protonic orbit in 60 degrees, the gyromagnetic ratio γ_{Op} and Landé factor g_{Op} of the protonic total by

being $Sin[60^\circ] = Cos[30^\circ] = \frac{\sqrt{3}}{2}$ and $Sin[30^\circ] = Cos[60^\circ] = \frac{1}{2}$

then the resultant of the angular momentum is

$$\varphi_{Op} = \sqrt{\left(\varphi_{op1} + \frac{1}{2}\varphi_{op2} + \frac{\sqrt{3}}{2}\varphi_{sp2} - \frac{1}{2}\varphi_{op3} + \frac{\sqrt{3}}{2}\varphi_{sp3}\right)^2 + \left(\varphi_{sp1} - \frac{\sqrt{3}}{2}\varphi_{op2} + \frac{1}{2}\varphi_{sp2} - \frac{\sqrt{3}}{2}\varphi_{op3} - \frac{1}{2}\varphi_{sp3}\right)^2} =$$

$$= \frac{5.73864817042480642384815519858\times10^{-34}}{(5.94651674925913562594460673457\times10^{-34})} \text{ kg.m}^2.\text{s}^{-1} \quad 432$$

the resultant of the magnetic moment is

$$\eta_{Op} = \sqrt{\left(\eta_{op1} + \frac{1}{2}\eta_{op2} + \frac{\sqrt{3}}{2}\eta_{sp2} - \frac{\sqrt{3}}{2}\eta_{op3} + \frac{1}{2}\eta_{sp3}\right)^2 + \left(\eta_{sp1} - \frac{\sqrt{3}}{2}\eta_{op2} + \frac{1}{2}\eta_{sp2} - \frac{1}{2}\eta_{op3} - \frac{\sqrt{3}}{2}\eta_{sp3}\right)^2} =$$

$$= \frac{2.07306177326955033752904387083\times10^{-26}}{(2.14452913966282826683849450338\times10^{-26})} \text{ A.m}^2 \quad 433$$

then

$$\gamma_{Op} = \frac{\eta_{Op}}{\varphi_{Op}} = \frac{3.612456647810298949480056762 70\times 10^{7}}{(3.6063618923296742141246795654 3\times 10^{7})}\ \text{Hz.T}^{-1} \qquad 434$$

$$g_{Op} = 2\cdot\frac{4\cdot m_p}{q}\cdot\gamma_{Op} = \frac{4.5179135374506778077829949325 0}{(4.5179135374506804723182540328 7)} \qquad 435$$

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

the resultant of the angular momentum is

$$\varphi_{On} = \sqrt{(\varphi_{on1}+\varphi_{sn2})^2 + (\varphi_{on2}-\varphi_{sn1})^2} =$$

$$= \frac{5.43952390266137437627492355442\times 10^{-36}}{(4.65949334753340648598297777225\times 10^{-36})}\ \text{kg.m}^2.\text{s}^{-1} \qquad 436$$

the resultant of the magnetic moment is

$$\eta_{On} = \sqrt{(\eta_{on1}+\eta_{sn2})^2 + (\eta_{sn1}-\eta_{on2})^2} =$$

$$= \frac{1.59621608340120441598777702095\times 10^{-25}}{(1.61897727744339885762449038040\times 10^{-25})}\ \text{A.m}^2 \qquad 437$$

then

$$\gamma_{On} = \frac{\eta_{On}}{\varphi_{On}} = \frac{q}{2\cdot m_n} = \frac{2.93447756083989295959472656250\times 10^{10}}{(3.47457793517493896484375000000\times 10^{10})}\ \text{Hz.T}^{-1} \qquad 438$$

$$g_{On} = 2\cdot\frac{4\cdot m_n}{q}\cdot\gamma_{On} = 2\cdot\frac{4\cdot m_n}{q}\cdot\frac{q}{2\cdot m_n} = 4. \qquad 439$$

Nucleus: Gyromagnetic ratios and Landé factors of helium 6

Is given, considering the displacement of the planes of protonic orbit in 60 degrees, the gyromagnetic ratio γ_N and Landé factor $\boldsymbol{g}_N$ of nucleus by

the resultant of the angular momentum is

$$\varphi_N = \sqrt{\begin{aligned}&\left(\varphi_{op1} + \frac{1}{2}\varphi_{op2} + \frac{\sqrt{3}}{2}\varphi_{sp2} - \frac{1}{2}\varphi_{op3} + \frac{\sqrt{3}}{2}\varphi_{sp3} - \varphi_{on1} - \varphi_{sn2}\right)^2 + \\ &+\left(\varphi_{sp1} - \frac{\sqrt{3}}{2}\varphi_{op2} + \frac{1}{2}\varphi_{sp2} - \frac{\sqrt{3}}{2}\varphi_{op3} - \frac{1}{2}\varphi_{sp3} + \varphi_{on2} - \varphi_{sn1}\right)^2\end{aligned}} = \\ = \frac{5.6926603091912998256506968966 8\times 10^{-34}}{\left(5.906213020731196160752194002 27\times 10^{-34}\right)} \text{ kg.m}^2\text{.s}^{-1} \quad 440$$

the resultant of the magnetic moment is

$$\eta_N = \sqrt{\begin{aligned}&\left(\eta_{op1} + \frac{1}{2}\eta_{op2} + \frac{\sqrt{3}}{2}\eta_{sp2} - \frac{\sqrt{3}}{2}\eta_{op3} + \frac{1}{2}\eta_{sp3} + \eta_{on1} + \eta_{sn2}\right)^2 + \\ &+\left(\eta_{sp1} - \frac{\sqrt{3}}{2}\eta_{op2} + \frac{1}{2}\eta_{sp2} - \frac{1}{2}\eta_{op3} - \frac{\sqrt{3}}{2}\eta_{sp3} + \eta_{sn1} - \eta_{on2}\right)^2\end{aligned}} = \\ = \frac{1.7833655884901235159580641597 5\times 10^{-25}}{\left(1.8157380715829254918089693322 8\times 10^{-25}\right)} \text{ A.m}^2 \quad 441$$

then

$$\gamma_N = \frac{\eta_N}{\varphi_N} = \frac{3.1327454856400322914123535156 3\times 10^{8}}{\left(3.0742847662445724010467529296 9\times 10^{8}\right)} \text{ Hz.T}^{-1} \quad 442$$

$$\boldsymbol{g}_N = 2\cdot\frac{6\cdot \boldsymbol{m}_p + 4\cdot \boldsymbol{m}_n}{\boldsymbol{q}}\cdot\gamma_N = \frac{39.222337453986945376982475863 8}{\left(38.548866486481017545884242281 3\right)} \quad 443$$

Atom: Gyromagnetic ratios and Landé factors of normal helium 6

Is given, considering the displacement of the planes of protonic orbit in 60 degrees, the gyromagnetic ratio γ_{TN} and Landé factor $\boldsymbol{g}_{TN}$ of normal helium 6 atom by

the resultant of the angular momentum is

$$\varphi_{TN} = \sqrt{\begin{aligned}&\left(\varphi_{op1} + \frac{1}{2}\varphi_{op2} + \frac{\sqrt{3}}{2}\varphi_{sp2} - \frac{1}{2}\varphi_{op3} + \frac{\sqrt{3}}{2}\varphi_{sp3} - \varphi_{on1} - \varphi_{sn2} - \varphi_{seN}\right)^2 + \\ &+\left(\varphi_{sp1} - \frac{\sqrt{3}}{2}\varphi_{op2} + \frac{1}{2}\varphi_{sp2} - \frac{\sqrt{3}}{2}\varphi_{op3} - \frac{1}{2}\varphi_{sp3} + \varphi_{on2} - \varphi_{sn1} + \varphi_{oeN}\right)^2\end{aligned}} = \\ = \frac{3.5494982314298183896328094425 3\times 10^{-34}}{\left(3.6484943151803369030761283152 1\times 10^{-34}\right)} \text{ kg.m}^2\text{.s}^{-1} \quad 444$$

the resultant of the magnetic moment is

$$\eta_{TN} = \sqrt{\begin{aligned}&\left(\eta_{op1} + \frac{1}{2}\eta_{op2} + \frac{\sqrt{3}}{2}\eta_{sp2} - \frac{\sqrt{3}}{2}\eta_{op3} + \frac{1}{2}\eta_{sp3} + \eta_{on1} + \eta_{sn2} + \eta_{seN}\right)^2 + \\ &+\left(\eta_{sp1} - \frac{\sqrt{3}}{2}\eta_{op2} + \frac{1}{2}\eta_{sp2} - \frac{1}{2}\eta_{op3} - \frac{\sqrt{3}}{2}\eta_{sp3} + \eta_{sn1} - \eta_{on2} - \eta_{oeN}\right)^2\end{aligned}} = \\ = \frac{2.6291233853126719157539951245 2\times 10^{-23}}{\left(2.6266811759088673253503760420 7\times 10^{-23}\right)} \text{ A.m}^2 \quad 445$$

then

$$\gamma_{TN} = \frac{\eta_{TN}}{\varphi_{TN}} = \frac{7.4070283005989868164062500000\times10^{10}}{(7.1993566359141662597656250000\times10^{10})}\ \text{Hz.T}^{-1} \quad \textbf{446}$$

$$\boldsymbol{g}_{TN} = 2\cdot\frac{6\cdot \boldsymbol{m}_p + 4\cdot \boldsymbol{m}_n + 2\cdot \boldsymbol{m}_e}{\boldsymbol{q}}\cdot\gamma_{TN} = \frac{9275.36824901718682667706161737}{(9029.00656834686742513440549374)} \quad \textbf{447}$$

Atom: Gyromagnetic ratios and Landé factors of ionized helium 6

Is given, considering the displacement of the planes of protonic orbit in 60 degrees, the gyromagnetic ratio γ_{TI} and Landé factor $\boldsymbol{g}_{TI}$ of ionized helium 6 atom by

the resultant of the angular momentum is

$$\varphi_{TI} = \sqrt{\begin{aligned}&\left(\varphi_{op1} + \frac{1}{2}\varphi_{op2} + \frac{\sqrt{3}}{2}\varphi_{sp2} - \frac{1}{2}\varphi_{op3} + \frac{\sqrt{3}}{2}\varphi_{sp3} - \varphi_{on1} - \varphi_{sn2} - \varphi_{seI}\right)^2 + \\ &+\left(\varphi_{sp1} - \frac{\sqrt{3}}{2}\varphi_{op2} + \frac{1}{2}\varphi_{sp2} - \frac{\sqrt{3}}{2}\varphi_{op3} - \frac{1}{2}\varphi_{sp3} + \varphi_{on2} - \varphi_{sn1} + \varphi_{oeI}\right)^2\end{aligned}} =$$

$$= \frac{4.50580621334652109263654642111\times10^{-34}}{(4.67907347579906760129659016651\times10^{-34})}\ \text{kg.m}^2.\text{s}^{-1} \quad \textbf{448}$$

the resultant of the magnetic moment is

$$\eta_{TI} = \sqrt{\begin{aligned}&\left(\eta_{op1} + \frac{1}{2}\eta_{op2} + \frac{\sqrt{3}}{2}\eta_{sp2} - \frac{\sqrt{3}}{2}\eta_{op3} + \frac{1}{2}\eta_{sp3} + \eta_{on1} + \eta_{sn2} + \eta_{seI}\right)^2 + \\ &+\left(\eta_{sp1} - \frac{\sqrt{3}}{2}\eta_{op2} + \frac{1}{2}\eta_{sp2} - \frac{1}{2}\eta_{op3} - \frac{\sqrt{3}}{2}\eta_{sp3} + \eta_{sn1} - \eta_{on2} - \eta_{oeI}\right)^2\end{aligned}} =$$

$$= \frac{1.32729584363685071238676877039\times10^{-23}}{(1.32623375565682890212459434214\times10^{-23})}\ \text{A.m}^2 \quad \textbf{449}$$

then

$$\gamma_{TI} = \frac{\eta_{TI}}{\varphi_{TI}} = \frac{2.94574551321205406188964843750\times10^{10}}{(2.83439395110234222412109375000\times10^{10})}\ \text{Hz.T}^{-1} \quad \textbf{450}$$

$$\boldsymbol{g}_{TI} = 2\cdot\frac{6\cdot \boldsymbol{m}_p + 4\cdot \boldsymbol{m}_n + \boldsymbol{m}_e}{\boldsymbol{q}}\cdot\gamma_{TI} = \frac{3688.77683385149157402338460088}{(3554.72897038056817109463736415)} \quad \textbf{451}$$

Summary of helium 6

First part - Calculations performed according to NIST constants

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

Particle in orbit		Gyromagnetic ratio $Hz.T^{-1}$	Landé factor
Electrons	normal	$8.79410054639707183837890625000 \times 10^{10}$	2.
Electrons	ionized	$8.79410054639707031250000000000 \times 10^{10}$	1.
Protons	Orbital 1	$4.78941687896661385893821716309 \times 10^{7}$	2.
Protons	Orbital 2	$4.78941687896661385893821716309 \times 10^{7}$	2.
Protons	Orbital 3	$4.78941687896661385893821716309 \times 10^{7}$	2.
Protons	Total	$3.60636189232967421412467956543 \times 10^{7}$	4.5179135
Negatrons	Orbital 1	$3.47457793517493972778320312500 \times 10^{10}$	2.
Negatrons	Orbital 2	$3.47457793517493972778320312500 \times 10^{10}$	2.
Negatrons	Total	$3.47457793517493896484375000000 \times 10^{10}$	4.

Table 2: The nuclear gyromagnetic ratios and Landé factor of helium 6.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$3.07428476624457240104675292969 \times 10^{8}$	$Hz.T^{-1}$
Landé factor	38.5488664864810175458842422813	Dimensionless

Table 3: The atomic gyromagnetic ratios and Landé factor of the normal helium 6.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$7.19935663591416625976562500000 \times 10^{10}$	$Hz.T^{-1}$
Landé factor	9029.00656834686742513440549374	Dimensionless

Table 4: The atomic gyromagnetic ratios and Landé factor of the ionized helium 6.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$2.83439395110234222412109375000 \times 10^{10}$	$Hz.T^{-1}$
Landé factor	3554.72897038056817109463736415	Dimensionless

The Helium family - Stability and Gyromagnetic ratios

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

Table 5: The orbital gyromagnetic ratios and Landé factor of helium 6.

Particle in orbit		Gyromagnetic ratio Hz.T^{-1}	Landé factor
Electrons	normal	$8.80343268251967926025390625000 \times 10^{10}$	2.
Electrons	ionized	$8.80343268251967926025390625000 \times 10^{10}$	1.
Protons	Orbital 1	$4.79751099864832535386085510254 \times 10^{7}$	2.
Protons	Orbital 2	$4.79751099864832535386085510254 \times 10^{7}$	2.
Protons	Orbital 3	$4.79751099864832535386085510254 \times 10^{7}$	2.
Protons	Total	$3.61245664781029894948005676270 \times 10^{7}$	4.5179135
Negatrons	Orbital 1	$2.93447756083989257812500000000 \times 10^{10}$	2.
Negatrons	Orbital 2	$2.93447756083989257812500000000 \times 10^{10}$	2.
Negatrons	Total	$2.93447756083989295959472656250 \times 10^{10}$	4.

Table 6: The nuclear gyromagnetic ratios and Landé factor of helium 6.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$3.13274548564003229141235351563 \times 10^{8}$	Hz.T^{-1}
Landé factor	39.2223374539869453769824758638	Dimensionless

Table 7: The atomic gyromagnetic ratios and Landé factor of the normal helium 6.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$7.40702830059898681640625000000 \times 10^{10}$	Hz.T^{-1}
Landé factor	9275.36824901718682667706161737	Dimensionless

Table 8: The atomic gyromagnetic ratios and Landé factor of the ionized helium 6.

Variable	Magnitude	Measure unit
Gyromagnetic ratio	$2.94574551321205406188964843750 \times 10^{10}$	Hz.T^{-1}
Landé factor	3688.77683385149157402338460088	Dimensionless

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