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Spin G-Factor of Physical Bodies (Co-Function Extrapolation)

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Abstract: *In this paper the validity of the approximate formula relating the particle radius and particle spin g-factor according to the pseudo-Heracletean dynamics on double surface is extended to all physical bodies in general. The mentioned extension could explain the practically unit spin g-factor of the ordinary physical bodies, i.e.* $g_{ordinary} = 1 + \left(\frac{3}{4}\frac{h}{mrc}\right)^2$. *Further the spin g-factor of neutrino is predicted in the range of* $g_{neutrino} = 2 \mp (10^{-12}, 10^{-16})$.

Keywords: *Pseudo-Heracletean dynamics on double surface, Compton wavelength, spin g-factor, surplus of the unit spin g-factor, spin g-factor divergence, double spin g-factor nature, spin g-factor of chemical elements and neutrino, mass-radius product, Hydrogen versus Cesium, Earth*

1. THE THEORETICAL BACKGROUND

The subject of interest in this paper is to investigate the possibility of the extension of the validity of the approximate relation between the particle spin g-factor and radius of that particle [1] to all physical bodies in general. Let us recall that relation [1]:

$$r_{particle} \approx \lambda_{particle}\ x \sqrt{\frac{1}{\left(\frac{1}{2-\left(1+\frac{2}{g_{factor}}\right)}\right)^2 - 1}}\ x\ \frac{1}{2}\left(+\frac{2}{g_{factor}}\right). \quad (1)$$

Here g_{factor} is a g-factor of some spinning particle and $\lambda_{particle}$ is Compton wavelength of that particle [1].

2. THE MASS-RADIUS PRODUCT TO SPIN G-FACTOR RELATION

Applying $\lambda = \frac{h}{mc}$ in the relation (1) and rearranging we have:

$$m_{particle}\ x\ r_{particle} \approx \frac{h}{c}\ x \sqrt{\frac{1}{\left(\frac{1}{2-\left(1+\frac{2}{g_{factor}}\right)}\right)^2 - 1}}\ x\ \left(\frac{1}{2}+\frac{1}{g_{factor}}\right). \quad (2)$$

We see that the particle mass-radius product $m_{particle}\ x\ r_{particle}$ is related to the spin g-factor g_{factor}. For every g-factor only one mass-radius product exists.

3. THE SPIN G-FACTOR TO MASS-RADIUS PRODUCT RELATION

Contrarily to the previous conclusion at a given mass-radius product $m_{particle}\ x\ r_{particle}$ two divergent solutions for the spin g-factor g_{factor} exist. Since the explicit formula (for the of the mr product dependent spin g-factor) is robust it is preferred to manage the divergence on the partially explicit way as follows:

$$g_{factor} \approx \frac{2}{1 \mp \frac{1}{\sqrt{\left(\frac{(\frac{1}{2}+\frac{1}{g_{factor}})h}{mrc}\right)^2+1}}}. \qquad (3)$$

The above formula for spin g_{factor} (3) depends on the size of the searched spin g_{factor}. It can be examined that at the spin $g_{factor} = 2$ only one solution is found. And further, more the spin g_{factor} differs from the value of 2 more the divergence increases. For both occasions the explicit formulas can be expressed.

3.1. The spin g-factor to mass-radius relation in the range of the spin g-factor around 2

Near the value of the spin g-factor 2 the next explicit formula for the spin g-factor can be used:

$$g_{factor}^{near\ two} \approx \frac{2}{1 \mp \frac{1}{\sqrt{\left(\frac{h}{mrc}\right)^2+1}}}. \qquad (4)$$

3.2. The spin g-factor to mass-radius relation at the range of the extreme spin g-factor

The minimal and maximal spin g-factor is 1 and ∞, respecitvelly. In the range of the extreme spin g-factor the next formulas can be used. For the spin g-factor near one it is expressed as:

$$g_{factor}^{near\ one} \approx \frac{2}{1 + \frac{1}{\sqrt{\left(\frac{3}{2}\frac{h}{mrc}\right)^2+1}}} \approx 1 + \left(\frac{3}{4}\frac{h}{mrc}\right)^2. \qquad (5a)$$

And for the spin g-factor near infinity it is expressed as:

$$g_{factor}^{near\ \infty} \approx \frac{2}{1 - \frac{1}{\sqrt{\left(\frac{1}{2}\frac{h}{mrc}\right)^2+1}}}. \qquad (5b)$$

According to the above divergent formulas possible double nature of physical bodies is to be taken into account.

4. THE SPIN G-FACTOR OF CHEMICAL ELEMENTS AND GREATER MACRO BODIES

The chemical elements and greater macro bodies have according to their size almost unit value of spin g-factor so the near to one spin g-factor formula $(5a)$ could be appropriate for the almost exact calculation. Hydrogen atom and the Earth, for instance, then possesses the spin g-factor $1 + 3.5\ x\ 10^{-10}$ and $1 + 2\ x\ 10^{-147}$, respectively. The tinny difference from the unit value is called the surplus of the unit spin g-factor:

$$g_{factor}^{near\ one} = 1 + surplus. \qquad (6)$$

4.1. The spin g-factor of chemical elements

The surplus of the unit spin g-factor of chemical elements is calculated with the help of the equation $(5a)$ using the data for mass and radius from the literature [2]. The surplus is expressed in femto (10^{-15}) units and collected in the Periodic Table 1 below. The greatest surplus possesses Hydrogen atom, i.e. $349201\,x\,10^{-15}$, and the smallest known surplus possesses Cesium atom, i.e. $0.6353\,x\,10^{-15}$. The surplus as a rule decreases by group and grows in a period.

Table1. *In the femto* (10^{-15}) *units expressed surplus of the unit spin g-factor of chemical elements through Periodic table*

Group / Period	1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H 349201																		2 He 64728
2	3 Li 1319	4 Be 978.2												5 B 1127	6 C 1539	7 N 1620	8 O 1691	9 F 1565	10 Ne 1695
3	11 Na 52.23	12 Mg 80.24												13 Al 98.31	14 Si 102.5	15 P 108.2	16 S 125.2	17 Cl 127.0	18 Ar 123.9
4	19 K 11.04	20 Ca 16.48		21 Sc 14.56	22 Ti 14.04	23 V 13.133	24 Cr 13.38	25 Mn 12.74	26 Fe 13.131	27 Co 12.42	28 Ni 13.03	29 Cu 11.74	30 Zn 11.55	31 Ga 11.08	32 Ge 12.09	33 As 13.66	34 Se 15.07	35 Br 17.66	36 Kr 18.33
5	37 Rb 1.943	38 Sr 2.706		39 Y 2.805	40 Zr 2.822	41 Nb 2.945	42 Mo 2.999	43 Tc 3.098	44 Ru 3.079	45 Rh 3.144	46 Pd 3.081	47 Ag 3.146	48 Cd 3.043	49 In 3.106	50 Sn 3.363	51 Sb 3.000	52 Te 4.080	53 I 4.679	54 Xe 4.956
6	55 Cs 0.6353	56 Ba 0.8193	*	71 Lu 0.6913	72 Hf 0.7230	73 Ta 0.7609	74 W 0.7916	75 Re 0.8132	76 Os 0.8046	77 Ir 0.8325	78 Pt 0.8539	79 Au 0.8484	80 Hg 0.7906	81 Tl 0.9803	82 Pb 0.9788	83 Bi 1.116	84 Po 1.251	85 At 1.401	86 Rn 1.404
7	87 Fr /	88 Ra /	**	103 Lr /	104 Rf /	105 Db /	106 Sg /	107 Bh /	108 Hs /	109 Mt /	110 Ds /	111 Rg /	112 Cn /	113 Uut /	114 Fl /	115 Uup /	116 Lv /	117 Uus /	118 Uuo /

*Lanthanoids *	57 La /	58 Ce /	59 Pr 0.8227	60 Nd 1.129	61 Pm 1.128	62 Sm 0.7782	63 Eu 0.8087	64 Gd 0.7423	65 Tb 0.7794	66 Dy 0.7260	67 Ho 0.7173	68 Er 0.6974	69 Tm 0.7085	70 Yb 0.6753
**Actinoids **	89 Ac /	90 Th /	91 Pa /	92 U /	93 Np /	94 Pu /	95 Am /	96 Cm /	97 Bk /	98 Cf /	99 Es /	100 Fm /	101 Md /	102 No /

The difference in the surplus of spin g-factor of chemical elements is very tinny. It can become important only in the case when other influences do not prevail. In such circumstances the element with a greater spin g-factor can realize the tendency to surround the element with a lower spin g-factor in free space.

5. THE NEUTRINO SPIN G-FACTOR

Knowing the neutrino mass and radius the spin g-factor can be calculated with the help of the divergent formula (4). The spin g-factor of massless and size-less neutrino should exactly equal the value 2. Contrarily the neutrino with non-two spin g-factor should possess some mass and size. With the help of the expected value of neutrino mass and radius [3], [4] its spin g-factor could be speculated, too. Such an attempt is represented in the Table 2.

Table2. *The speculated neutrino spin g-factor derived from the possible values of neutrino mass and radius*

Spin g-factor	$m = 2\ eV/c^2$	$m = 0.2\ eV/c^2$	$m = 0.02\ eV/c^2$
$r = 10^{-18}m$	$2 \mp 3\,x\,10^{-12}$	$2 \mp 3\,x\,10^{-13}$	$2 \mp 3\,x\,10^{-14}$
$r = 10^{-19}m$	$2 \mp 3\,x\,10^{-13}$	$2 \mp 3\,x\,10^{-14}$	$2 \mp 3\,x\,10^{-15}$
$r = 10^{-20}m$	$2 \mp 3\,x\,10^{-14}$	$2 \mp 3x\,10^{-15}$	$2 \mp 3\,x\,10^{-16}$

The minus or plus sign of the surplus of the two units spin g-factor given in the above table depends on the expressed neutrino spin g-factor nature.

6. Conclusions

We do not need the luxury of pure functions as long as some trivial function fits well the nature.

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Dedication

This fragment is dedicated to Guardian angel who doesn't forget to wake up me in the morning and to my wife Ivka for her 60^{th} birthday.

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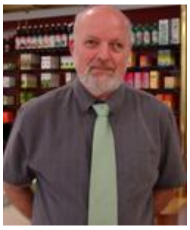
Author's Biography



Janez Špringer, 64 years old pharmacist, is an independent scientist who prefers to publish papers in opened accessed scientific journals such as Progress in Physics, GJSFR, IJARCS and IJARPS.