International Journal of Advanced Research in Physical Science (IJARPS)
Volume 2, Issue 12, December 2015, PP 34-36
ISSN 2349-7874 (Print) & ISSN 2349-7882 (Online)
www.arcjournals.org

Pseudo-Heracletean Dynamics on Double Surface (Sightseeing Fragments)

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Abstract: *In this paper Heracletean thought claiming that "You could not step twice into the same river" is confirmed for the electron circulation in the ground state of Hydrogen atom. Further the approximate relation* $g_e \approx 2(1+\frac{2-spin^{-1}}{spin^{-1}-1})$ *between the electron spin g-factor* g_e *and electron spin is revealed.*

Keywords: *Pseudo-Heracletean dynamics, double surface, Bohr orbit and electron circumference, Compton wavelength, superluminal circulation in Hydrogen atom, electron spin g-factor and electron spin, path-translation ratio, arc between primary orbital positions, arc between primary rotational positions, direct communication frequency*

1. The Theoretical Background

The subject of interest in this paper is to investigate the direct electron proton-nucleus communication [1] on the double surface [2] in the ground state of Hydrogen atom.

1.1. The Direct Electron Proton-Nucleus Communication

Respecting pseudo-Heracletean dynamics [1] electron during the circulation on Bohr orbit cannot stay at rest but somehow communicates in the radial direction with proton-nucleus [1]. In one superluminal circulation cycle it twice touches the proton-nucleus and on the other hand occupies primary orbital position twice [1]. The electron frequency of occupying primary orbital position $f_{orbital}$ is a little greater than factor 2 and equals the electron spin g-factor g_e [1]:

$$f_{orbital} = g_e = 2{,}002319 > 2. \tag{1}$$

1.2. The Inverse Value of the Electron Spin G-Factor as the Arc Between Primary Orbital Positions of Electron

The inverse value of the electron spin g-factor equals the arc between primary orbital positions of electron, denoted $arc_{orbital}$, during superluminal circulation around proton-nucleus [1]:

$$arc_{orbital} = \frac{1}{f_{orbital}} = \frac{1}{g_e} = \frac{1}{2.002319} < 1 = Bohr\ cycle. \tag{2}$$

1.3. The Double Surface

The double-surface is a pseudo-Euclidean surface with the equally expressed elliptic and hyperbolic characteristics [2] where in a circulation due to the rotation of length unit π [3] holds the next relation between the path s and translation n [2] :

$$\frac{s}{n} = 2 - 1/\sqrt{1+\frac{\pi^2}{n^2}}. \tag{3}$$

Here the path s, translation n and rotation π are expressed in the units of Compton wavelength $\lambda = \frac{h}{mc}$ of the mass body with mass m being involved in a circumference concluded curved motion [2], [3].

2. The Path-Translation Ratio

It can be examined(3) that the path s is greater than translation n for any finite translation n. Only the infinite translation n equals the path s:

$$\lim_{n\to\infty}\left(\frac{s}{n} = 2 - 1/\sqrt{1+\pi^2/n^2}\right) = 1, \tag{4}$$

And (3) at the zero translation n the path s is twice the translation n:

$$\lim_{n\to 0}\left(\frac{s}{n} = 2 - 1/\sqrt{1+\pi^2/n^2}\right) = 2. \qquad (5)$$

3. THE PATH-TRANSLATION INEQUALITY ON BOHR ORBIT

Inserting the translation of the electron on Bohr orbit $n = 137$ in the relation (3) the path on Bohr orbit s_{Bohr} being equal the theoretical inverse fine structure constant on the pseudo-Euclidean surface $\lambda^{-1}_{Pseudo\ -Euclidean}$ is calculated [2]:

$$s_{Bohr} = \lambda^{-1}_{Pseudo\ -Euclidean} = 137{,}036006. \qquad (6)$$

Here the path s only slightly surpasses the translation n but nevertheless reminds the conceptual inequality between the translation length n and the path s provided on it [3]:

$$\frac{s_{Bohr}}{n_{Bohr}} = 1.000263 > 1. \qquad (7)$$

4. THE INVERSE PATH-TRANSLATION RATIO ON THE ELECTRON CIRCUMFERENCE AS THE ELECTRON SPIN

The path on the electron circumference $2\pi r_e$ is related to inverse fine structure constant α^{-1} as follows [4]:

$$2\pi r_e = \frac{\lambda_e}{\alpha^{-1}},$$

$$s_{2\pi r_e} = \frac{1}{\alpha^{-1}}. \qquad (8)$$

Here r_e is the electron radius, λ_e is Compton wavelength of electron, and $s_{2\pi r_e}$ is the path on the electron circumference expressed in Compton wavelengths of electron. Applying again the relation (3) the inverse path-translation ratio on the electron circumference $\frac{n_{2\pi r_e}}{s_{2\pi r_e}}$ is calculated. It represents the electron frequency of occupying primary rotational position $f_{rotational}$ or briefly electron $spin$:

$$f_{rotational} = \frac{n_{2\pi r_e}}{s_{2\pi r_e}} = \frac{1}{1.998838} = spin \approx \frac{1}{2}. \qquad (9)$$

Being less than one means that electron in one superluminal circulation does not conclude its rotation but makes only the $1/1.998838$ share of it.

5. THE PATH-TRANSLATION RATIO ON THE ELECTRON CIRCUMFERENCE AS THE ARC BETWEEN PRIMARY ROTATIONAL POSITIONS OF ELECTRON

The electron should circulate on Bohr orbit a little less than twice, i.e. $1.998838 \ldots - times$, to occupy again the primary rotational position (9). Thus, the arc between primary rotational positions, denoted $arc_{rotational}$, equals the inverse spin $\frac{s_{2\pi r_e}}{n_{2\pi r_e}}$:

$$arc_{rotational} = \frac{1}{f_{rotational}} = \frac{s_{2\pi r_e}}{n_{2\pi r_e}} = 1.998838 > 1 = Bohr\ cycle. \qquad (10)$$

6. THE ROTATIONAL ARC AND ORBITAL ARC RATIO AS THE DIRECT COMMUNICATION FREQUENCY PER ONE ELECTRON ROTATION

The rotational arc $(9), (10)$ and orbital arc (2) ratio $\frac{arc_{\ rotational}}{arc_{\ orbital}}$ is the direct communication frequency per one electron rotation:

$$f_{communication} = \frac{f_{orbital}}{f_{rotational}} = \frac{\frac{1}{arc_{orbital}}}{\frac{1}{arc_{rotational}}} = \frac{arc_{rotational}}{arc_{orbital}} = \frac{\frac{s_{2\pi r_e}}{n_{2\pi r_e}}}{\frac{1}{g_e}} = spin^{-1}\ x\ g_e$$

$$= 1.998838\ x\ 2{,}002319 = \frac{4{,}002311 \ldots}{1}. \qquad (11)$$

It tells us how many cycles of the direct communication between electron and proton-nucleus is provided during one electron rotation. It can be written in the modified form:

$$f_{communication} = \frac{1\,x\,4{,}002311\ldots}{1} = \frac{2\,x\,4{,}002311\ldots}{2} = \frac{m\,x\,4{,}002311\ldots}{m}, \quad m \in \mathbb{N}. \tag{12}$$

In that form (12) it tells us how many cycles of the direct communication is provided during the natural number of electron rotations m. The multiple-number of cycles $m\,x\,f_{comunication}$ is a natural number only in the case when $f_{communication}$ is a rational number:

$$f_{communication}\ \ x\,m \in \mathbb{N}, \qquad if\ f_{communication} \in \mathbb{Q}. \tag{13}$$

The formula for the direct communication frequency $f_{communication}$ can be written also as (11):

$$f_{communication} = \frac{s_{2\pi r_e}}{n_{2\pi r_e}}\,xg_e. \tag{14}$$

Factor $\frac{s_{2\pi r_e}}{n_{2\pi r_e}}$ is dependent of π according to the relation $\frac{s}{n} = 2 - 1/\sqrt{1+\pi^2/n^2}$ (3) as well as factor g_e is dependent of π according to the relation $g_e = \frac{\alpha^{-1}\sqrt{k}}{2\pi(1+\frac{m_e}{m_p})m_e c}$ [1]. Since π is an irrational number the direct communication frequency $f_{communication}$ being dependent on it is probably irrational, too. This fact implies that electron in the finite number of circulations always concludes the rotation in the non-primary position of Bohr orbit. Or using Heracletean words: “The electron could not step twice into the same river.”

7. The Electron Spin Related To Electron Spin G-Factor

Respecting the similarity of decimal values of the direct communication frequency $f_{communication} = 4{,}002311\ldots$ (11) and electron spin g-factor $g_e = 2{,}002319\ldots$ (11) the next approximate relation between the inverse electron spin $spin^{-1}$ and electron spin g-factor g_e is given:

$$g_e \approx 2(1 + \frac{2 - spin^{-1}}{spin^{-1} - 1}) = 2.002327. \tag{15}$$

The calculated value of $g_e = 2.002327$ differs from the experimental value $g_e = 2.002319$ on the fifth decimal place:

$$\Delta g_e = 0{,}000008. \tag{16}$$

8. Conclusions

Sightseeing fragments is a double flirting: with imagination as well as with knowledge. The former is more than the latter. But a flirting remains a flirting.

Dedication

This fragment is dedicated to Merry Christmas and Happy New Year 2016.

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