International Journal of Advanced Research in Physical Science (IJARPS)
Volume 12, Issue 02, 2025, PP 3-5
ISSN (Online)-2349-7882
www.arcjournals.org

Energy of Maximum Spin Object Delocalization on Double Surface

Janez Špringer*

Cankarjeva cesta 2, 9250 Gornja Radgona, Slovenia, EU

***Corresponding Author:** *Janez Špringer,* Cankarjeva cesta 2, 9250 Gornja Radgona, Slovenia, EU*

Abstract: *The energy of maximum spin object delocalization on double surface was presented*

Keywords: *spin object delocalization, double surface, non-zero energy*

1. INTRODUCTION

In the previous article [1], the energy of a spin object delocalization on an elliptic surface was defined as the sum of the inner energy $\boldsymbol{E_{inner}}$ and the outer energy $\boldsymbol{E_{outer}}$ given by the next equation:

$$E_{delocalization} = E_{inner} + E_{outer} = \left(1 - \frac{1}{1-\Delta_{inner}}\right)mc^2 + \left(1 - \frac{1}{1+\Delta_{outer}}\right)mc^2. \tag{1}$$

Where Δ_{inner} and Δ_{outer} denote the simultaneous orbit contraction and dilation, respectively. And $\boldsymbol{(1-\Delta_{inner})}$ and $\boldsymbol{(1+\Delta_{outer})}$ is the inner and the outer delocalized orbit length, respectively.

To find the energy of spin object delocalization on the double surface the relation between the elliptic length $\boldsymbol{n}$ and the double surface (average elliptic-hyperbolic) length $\boldsymbol{s(n)}$ should be taken into account [2]:

$$s(n) = n\left(2 - \frac{1}{\sqrt{1+\frac{\pi^2}{n^2}}}\right). \tag{2}$$

Where $\boldsymbol{n}$ and $\boldsymbol{s(n)}$ denotes the elliptic and the average elliptic-hyperbolic length, respectively. Transforming

$$1 \to s(1),$$
$$1-\Delta_{inner} \to s(1-\Delta_{inner}),$$
$$1+\Delta_{outer} \to s(1+\Delta_{outer}). \tag{3}$$

We get the energy of a spin object delocalization on the double surface:

$$E_{delocalization} = E_{inner} + E_{outer} = \left(1 - \frac{s(1)}{s(1-\Delta_{inner})}\right)mc^2 + \left(1 - \frac{s(1)}{s(1+\Delta_{outer})}\right)mc^2. \tag{4}$$

2. HALF OF COMPTON WAVELENGTH AS THE LOWER LIMIT OF THE ELLIPTIC INNER ORBIT LENGTH OF SPIN OBJECT

Suppose that the object is localized on an original elliptic orbit of one Compton wavelength. When this orbit contracts for approximately $(\Delta_{inner} = \mathbf{0.54})$ of Compton wavelength the energy $\boldsymbol{-mc^2}$ is released (negative sign), so the resulting elliptic orbit of approximately $(\mathbf{1} - \Delta_{inner} = \mathbf{0.46})$ of Compton wavelength should be the shortest inner elliptic orbit length of a spin object:

$$E_{inner} = \left(1 - \frac{s(1)}{s(1-0.542924746811)}\right)mc^2 = \left(1 - \frac{s(1)}{s(0.4570752531886)}\right)mc^2$$
$$= \left(1 - \frac{1.696\,685\,528\,947}{0.8483427644735}\right)mc^2 = -mc^2 < 0. \tag{5}$$

And simultaneously consuming the energy $\boldsymbol{mc^2}$ (positive sign) the object behaves as a wave since the original orbit dilates to an orbit of infinite Compton wavelengths:

$$E_{outer} = \left(1 - \frac{s(1)}{s(1+\infty)}\right) mc^2 = \left(1 - \frac{1.696\,685\,528\,947}{\infty}\right) mc^2 = mc^2 > 0. \quad (6)$$

No energy is needed $(\boldsymbol{E_{delocalization} = 0})$ for the present simultaneous object delocalization from the original one to the inner $(\boldsymbol{1 - \Delta_{inner} = 0.46})$ of Compton wavelength as well as from the original one to the outer infinite Compton wavelengths $(\boldsymbol{1 + \Delta_{outer} = \infty})$ as follows:

$$E_{delocalization} = E_{inner} + E_{outer} = -mc^2 + mc^2 = 0. \quad (7)$$

But such a delocalization is doubtful since the spin object collapses on the elliptic orbit $(\boldsymbol{1 - \Delta_{inner} = 0.5})$ of Compton wavelength before it contracts further to the elliptic orbit $\boldsymbol{0.46}$ of Compton wavelength. So, the lower limit of the elliptic inner orbit is $\boldsymbol{0.5}$ of Compton wavelength.

3. Ten Compton Wavelengths as the Upper Limit of the Elliptic Outer Orbit Length of Spin Object

At the contraction to the shortest inner elliptic orbit $\boldsymbol{0.5}$ Compton wavelength of a spin object the maximum energy is released (negative sign) yielding:

$$E_{inner} = \left(1 - \frac{s(1)}{s(1-0.50)}\right) mc^2 = \left(1 - \frac{s(1)}{s(0.50)}\right) mc^2 = \left(1 - \frac{1.696\,685\,528\,947}{0.921\,411\,637\,261}\right) mc^2$$
$$= -0.841\,397\,981\,460\,9\, mc^2 < 0. \quad (8)$$

Consuming the maximum energy of **0.84** $\boldsymbol{mc^2}$ enables the simultaneous dilation to the longest outer elliptic orbit of a spin object, i.e. $\boldsymbol{1 + \Delta_{outer} = 10.25}$ Compton wavelengths as follows:

$$E_{outer} = \left(1 - \frac{s(1)}{s(10.25)}\right) mc^2 = \left(1 - \frac{1.696\,685\,528\,947}{10.697\,754\,950\,254}\right) mc^2 = 0.841\,397\,981\,460\,9\, mc^2 > 0. \quad (9)$$

No energy is needed $(\boldsymbol{E_{delocalization} = 0})$ for the present simultaneous object delocalization from the original one to the inner $(\boldsymbol{1 - \Delta_{inner} = 0.5})$ of Compton wavelength as well as to the outer $(\boldsymbol{1 + \Delta_{outer} = 10.25})$ Compton wavelengths as follows:

$$E_{delocalization} = E_{inner} + E_{outer} = -0.84mc^2 + 0.84mc^2 = 0. \quad (10)$$

But such a delocalization is doubtful since the spin object is unstable on the non-integer elliptic outer orbit so dilating stops at the integer value before. The upper limit of the elliptic outer orbit is then $\boldsymbol{10}$ Compton wavelengths long.

4. The Energy of Maximum Delocalization on Double Surface

The energy of maximum delocalization – spreading from minimum elliptic inner orbit of $\boldsymbol{0.5}$ Compton wavelength to maximum elliptic outer orbit of $\boldsymbol{10}$ Compton wavelengths – is the next:

$$E_{delocalization} = E_{inner} + E_{outer} = \left(1 - \frac{s(1)}{s(0.5)}\right) mc^2 + \left(1 - \frac{s(1)}{s(10)}\right) mc^2. \quad (11a)$$

Yielding:

$$E_{delocalization} = -0.841\,397\,981\,461\, mc^2 + 0.837\,788\,594\,729 mc^2 = -0.003\,609\,386\,732\, mc^2. \quad (11\,b)$$

For instance, for the electron $(\boldsymbol{m_e c^2 = 510\,998.950\,69\ \mathrm{eV}})$ the next energy of maximum delocalization is given:

$$E_{delocalization}^{electron} = -1\,844.39\, eV. \quad (11c)$$

5. Conclusion

At maximum spin object delocalization on the double surface the energy should be released (negative sign). And for the reversed process – localization – the same energy should be consumed (positive sign). Maybe it is hidden in RAES (Resonant Auger electron spectra) [3].

Dedication

To non-zero energy

References

[1] Janez Špringer. " Delocalized Spin Object" International Journal of Advanced Research in Physical Science (IJARPS), vol 12, no. 02, pp. 1-2, 2025.

[2] Janez Špringer. " Excess Energy of Delocalized Bohr Orbit " International Journal of Advanced Research in Physical Science (IJARPS), vol 12, no. 01, pp. 23, 2025.

[3] Suzuki, Isao & Endo, Hikari & Nagai, Kanae & Takahashi, Osamu & Tamenori, Yusuke & Nagaoka, Shin-Ichi. (2013). Site-dependent Si KL23L23 resonant Auger electron spectra following inner-shell excitation of Cl3SiSi(CH3)3. The Journal of chemical physics. 139. 174314. 10.1063/1.4827860.

Citation: *Janez Špringer. " Energy of Maximum Spin Object Delocalization on Double Surface" International Journal of Advanced Research in Physical Science (IJARPS), vol 12, no. 02, pp. 3-5, 2025.*

Copyright: *© 2025 Authors. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.*