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Delocalized Spin Object

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Abstract: *Delocalized spin object as a consequence of simultaneous contraction and dilation was presented*

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1. Introduction

To describe the delocalized spin object we can use the pattern of the delocalized electron rotation in Bohr orbit. [1] The energy constant $Ry = \frac{mv^2}{2}$ should be replaced by mc^2 as well as elliptic orbit length 137 is replaced by 1 Compton wavelength. Then the energy of delocalization $E_{delocalization}$ as a sum of inner E_{inner} and outer energy E_{outer} is given by the next equation:

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

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

2. Delocalized Object from the Original One to the Inner Half Compton Wavelength as Well as from the Original One to the Outer Infinite Compton Wavelengths

Suppose that the object is localized in an original orbit of one Compton wavelength. When this orbit contracts to a half-wavelength shorter orbit the energy $-mc^2$ is released (negative sign) and the resulting half Compton wavelength orbit collapses:

$$E_{inner} = \left(1 - \frac{1}{1 - 0.5}\right) mc^2 = \left(1 - \frac{1}{0.5}\right) mc^2 = -mc^2 < 0. \quad (2)$$

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

$$E_{outer} = \left(1 - \frac{1}{1 + \infty}\right) mc^2 = \left(1 - \frac{1}{\infty}\right) mc^2 = mc^2 > 0. \quad (3)$$

No energy is needed ($E_{delocalization} = 0$) for the present simultaneous object delocalization from the original one to the inner half ($\Delta_{inner} = 0.5$) Compton wavelength as well as from the original one to the outer infinite Compton wavelengths ($\Delta_{outer} = \infty$) as follows:

$$E_{delocalization} = E_{inner} + E_{outer} = -mc^2 + mc^2 = 0. \quad (4)$$

3. Delocalized Object from the Original One to the Inner Three Quarters of the Compton Wavelength as Well as from the Original One to the Outer One and a Half Compton Wavelength

The contraction of object orbit for less than half Compton wavelength is needed to apply enough energy for the simultaneous dilation of object to any finite orbit. For instance, for the simultaneous dilation of object orbit for a half Compton wavelength ($\Delta_{outer} = 0.5$) the simultaneous contraction for a quarter Compton wavelength ($\Delta_{inner} = 0.25$) is needed as follows:

$$E_{inner} = \left(1 - \frac{1}{1 - 0.25}\right) mc^2 = \left(1 - \frac{1}{0.75}\right) mc^2 = -\frac{1}{3} mc^2. \quad (5)$$

And

$$E_{outer} = \left(1 - \frac{1}{1+0.5}\right) mc^2 = \left(1 - \frac{1}{1.5}\right) mc^2 = \frac{1}{3} mc^2. \tag{6}$$

The energy of present object delocalization $E_{delocalization}$ from the original one Compton wavelength to the inner three quarters of Compton wavelength ($1 - \Delta_{inner} = 0.75$) as well as from the original one Compton wavelength to the outer one and a half Compton wavelength ($1 + \Delta_{outer} = 1.5$) is zero as follows:

$$E_{delocalization} = E_{inner} + E_{outer} = -\frac{1}{3} mc^2 + \frac{1}{3} mc^2 = 0. \tag{7}$$

4. Coincidental Result

Interesting is the length ratio of the delocalized inner orbit ($1 - \Delta_{inner} = 0.75$) and the outer orbit ($1 + \Delta_{outer} = 1.5$). It equals ½ spin:

$$\frac{1 - \Delta_{inner}}{1 + \Delta_{outer}} = \frac{1 - 0.25}{1 + 0.5} = \frac{0.75}{1.5} = \frac{1}{2}. \tag{8}$$

5. Conclusion

It could mean that at ½ spin objects like an electron we have deal with the heterogeneous rotation as a consequence of object delocalization where two inner rotations are needed (720 degrees) for one outer rotation (360 degrees).

Dedication

To unity

References

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

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