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Fine Structure Constant Related to Special Relativistic Mass at Luminal Speed in Heraclitean Dynamics

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Abstract: *The Inverse fine structure constant* α^{-1} *has been related to the special relativistic mass belonging to the special ground mass* $m_{ground}^2c^2 = k(1-lnk)$ *at the luminal speed in Heraclitean dynamics F = dp/dt + d(k/p)/dt.*

Keywords: *Inverse fine structure constant, special relativistic mass at luminal speed in Heraclitean dynamics*

1. Introduction

In the previous article [1] the inverse fine structure constant α^{-1} was deduced from the special ground mass $m_{ground}^2c^2 = k(1-lnk)$ in Heraclitean dynamics defined as F = dp/dt + d(k/p)/dt and consequently:

$$m_{relativistic}^2c^2a^2 = e^{\frac{m_{ground}^2c^2-k(1-lnk)+m_{relativistic}^2c^2(a^2-1)}{k}}. \tag{1}$$

Here k is the dynamics constant, c is the luminal speed and $a = \frac{v}{c}$ is the relative speed of a particle which possesses the ground mass m_{ground} and according to the speed and inverse speed manifests the relativistic mass $m_{relativistic}$. For the ordinary matter holds $k = hc$ and h being Planck constant.

To relate α^{-1} to the special relativistic mass $m_{relativistic}$ belonging to the special ground mass $m_{ground}^2c^2 - k(1-lnk) = 0$ at the luminal speed $a = 1$ in Heraclitean dynamics is the subject of interest of this paper.

2. The Special Relativistic Mass of the Special Ground Mass at the Luminal Speed

The special ground mass satisfies the next relation [1]:

$$m_{ground}^2c^2 - k(1-lnk) = 0. \tag{2}$$

So the relativistic equation (1) can take the simplified form

$$m_{relativistic}^2c^2a^2 = e^{\frac{m_{relativistic}^2c^2(a^2-1)}{k}}. \tag{3}$$

And at the luminal speed where $a = 1$ the special relativistic mass is given by the next nominal equality:

$$m_{relativistic} = c^{-1}. \tag{4a}$$

With the help of the necessary data [2]

$c = 2{,}997\ 924\ 58\,.\,10^8 ms^{-1}$,

$m_{electron} = 9{,}109\ 383\ 701\ 15.10^{-31}kg$,

$m_{Rydberg} = 0{,}000\ 242\ 543\ 510\ 477\ 160.10^{-31}kg$,

$m_{electron} + m_{Rydberg} = 9{,}109\ 626\ 244\ 660\ 477\ 160.10^{-31}kg.$

The next numbers are given:

$$\frac{m_{relativistic}}{m_{electron}} = 3\,661\,763\,585\,126\,420\,444\,301{,}000\,070\,569\,6\,. \tag{4b}$$

And

$$\frac{m_{relativistic}}{m_{electron} + m_{Rydberg}} = 3\,661\,666\,090\,786\,848\,108\,259{,}936\,623\,981\,3\,. \tag{4c}$$

3. The Prediction of the Inverse Fine Structure Constant from the Special Relativistic Mass

The nominal values of the special relativistic mass (4b), (4c) are related to the inverse fine structure constant α^{-1} as follows (See appendix):

$$\frac{\frac{m_{relativistic}}{m_{electron}}}{\frac{m_{relativistic}}{m_{electron} + m_{Rydberg}}} - 1 = \frac{1}{2\alpha^{-2}}. \tag{5}$$

Giving the result

$$\alpha^{-1} = 137{,}035\,999\,080\,930\,910\,059. \tag{6}$$

The above α^{-1}(6) to hexadecimal equals the inverse fine structure constant which could be predicted using integer numbers in Eq. (5), i.e. $3\,661\,763\,585\,126\,420\,444\,301$(4b), and $3\,661\,666\,090\,786\,848\,108\,260$(4c):

$$\alpha^{-1}_{predicted} = 137{,}035\,999\,080\,930\,910\,104\,. \tag{7}$$

And

$$\alpha^{-1}_{predicted} - \alpha^{-1} = 0{,}000\,000\,000\,000\,000\,1. \tag{8}$$

4. Conclusion

If the special relativistic mass at the luminal speed – characterised by the nominal equality $m_{relativistic} = c^{-1}$ – consists of an integer number of electron and Rydberg masses – the exact value of the inverse fine structure constant could be calculated.

Dedication

To keep moving

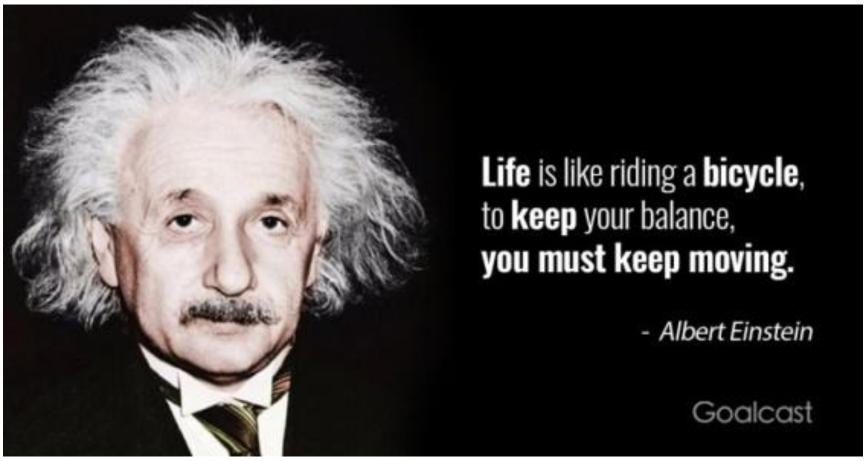

Figure1. *Keep moving [3]*

References

[1] Janez Špringer (2022) "Fine Structure Constant Deduced from Special Ground Mass in Heraclitean Dynamics" International Journal of Advanced Research in Physical Science (IJARPS) 9(9), pp.12-15, 2022.

[2] https://physics.nist.gov/cgi-bin/cuu/Results?search_for=electron+mass

[3] 22 Empowering Quotes to Inspire You to Keep Going (goalcast.com)

APPENDIX

The next equation is of relativistic mass independent

$$\frac{\frac{m_{relativistic}}{m_{electron}}}{\frac{m_{relativistic}}{m_{electron}+m_{Rydberg}}}-1=\frac{1}{2\alpha^{-2}}. \qquad (a)$$

Since by solving the double fraction we get

$$\frac{m_{electron}+m_{Rydberg}}{m_{electron}}-1=\frac{1}{2\alpha^{-2}}. \qquad (b)$$

And rearranging we have

$$\frac{m_{Rydberg}}{m_{electron}}=\frac{1}{2\alpha^{-2}}. \qquad (c)$$

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