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Fine Structure Constant Deduced from Special Ground Mass in Heraclitean Dynamics

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Abstract: *Inverse fine structure constant α^{-1} has been deduced from special ground mass $m_{ground}^2c^2 = k(1 - lnk)$ in Heraclitean dynamics F = dp/dt + d(k/p)/dt.*

Keywords: *Inverse fine structure constant, special ground mass in Heraclitean dynamics*

1. Introduction

To deduce the inverse fine structure constant α^{-1} from special ground mass - defined as $m_{ground}^2c^2 = k(1 - lnk)$ - in Heraclitean dynamics - expressed as F = dp/dt + d(k/p)/dt - is the subject of interest of this paper.

2. Heraclitean Dynamics

The relativistic mass and ground mass are implicitly related as follows [1]:

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

Where k is the dynamics constant, c is the speed of light and $a = v/c$ is the relative speed of a particle which possesses the ground mass m_{ground} and according to its speed and inverse speed manifests the relativistic mass $m_{relativistic}$. For the ordinary matter holds $k=hc$ where h is Planck constant. [2]

3. The Special Ground Mass

The special ground mass satisfies the next relation:

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

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

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

And at luminal speed where $a = 1$ holds nominal equality:

$$m_{relativistc} = c^{-1}. \quad (4)$$

4. The Special Ground Mass Value

The special ground mass (2) is explicitly expressed as follows:

$$m_{special} = \frac{\sqrt{k(1 - lnk)}}{c}. \quad (5)$$

And for $k = hc$ we have:

$$m_{special} = \frac{\sqrt{hc(1 - lnhc)}}{c}. \quad (6)$$

With the help of $h = 6{,}626\ 070\ 15\ .\ 10^{-34} Js$ and $c = 2{,}997\ 924\ 58\ .\ 10^{8} ms^{-1}$ the next value is given:

$$m_{special} = 1{,}131\ 033\ 510\ 688\ 174\ \ x\ 10^{-20} kg. \quad (7)$$

It attracts attention if it is expressed in other units:

$$m_{special} = 1.241.613.645{,}6579\ m_{electron} = 1.241.580.587{,}7415\ \left(m_{electron} + m_{Rydberg}\right). \quad (8)$$

Since

$$0{,}6579 \approx \frac{2}{3} \quad and \quad 0{,}7415 \approx \frac{3}{4}. \quad (9)$$

With 1,3% and 1,1% precision deficit, respectively.

5. The Relation between Electron Mass and Rydberg Mass

Both masses are related by the inverse fine structure constant α^{-1}as follows:

$$\frac{m_{electron}}{m_{Rydberg}} = 2\alpha^{-2}. \quad (10)$$

Consequently, any mass expressed in mentioned units, special being no exception, reflects the inverse fine structure constant, too (See appendix):

$$\frac{\frac{m_{special}}{m_{electron}}}{\frac{m_{special}}{m_{electron} + m_{Rydberg}}} - 1 = \frac{1}{2\alpha^{-2}}. \quad (11)$$

6. The Speculative Prediction of the Exact Inverse Fine Structure Constant

If the special mass expressed in the units of electron mass and Rydberg mass (8) should be rational as it suggests the relation (9) the exact inverse fine structure can be offered as follows:

For

$$\frac{m_{special}}{m_{electron}} = 1.241.613.645 + \frac{2}{3}. \quad (12a)$$

And

$$\frac{m_{special}}{m_{electron} + m_{Rydberg}} = 1.241.580.587 + \frac{3}{4}. \quad (12b)$$

According to (11)

$$\frac{1.241.613.645 + \frac{2}{3}}{1.241.580.587 + \frac{3}{4}} - 1 = \frac{1}{2\alpha^{-2}}. \quad (12c)$$

The next value of the inverse fine structure constant is given

$$\alpha^{-1} = 137{,}036\ 014. \quad (12d)$$

The result coincides with the value of the inverse fine structure constant reflecting the two-sided geometric distribution of the path of the electron in the ground state of Hydrogen atom [3].

7. Conclusion

The accuracy of the value of the considered inverse fine structure constant α^{-1} is a consequence of chosen units in which the special ground mass in Heraclitean dynamics is expressed. The precision of the α^{-1} value reflects the beauty of the rational numbers 2/3 and 3/4. The coincident equality of the value predicted in two different occasions of physics enhances beauty but does not evoke truth. The latter continues to wait patiently for us. So let us be kind and keep going.

DEDICATION

To KINDNESS, BEAUTY and TRUTH

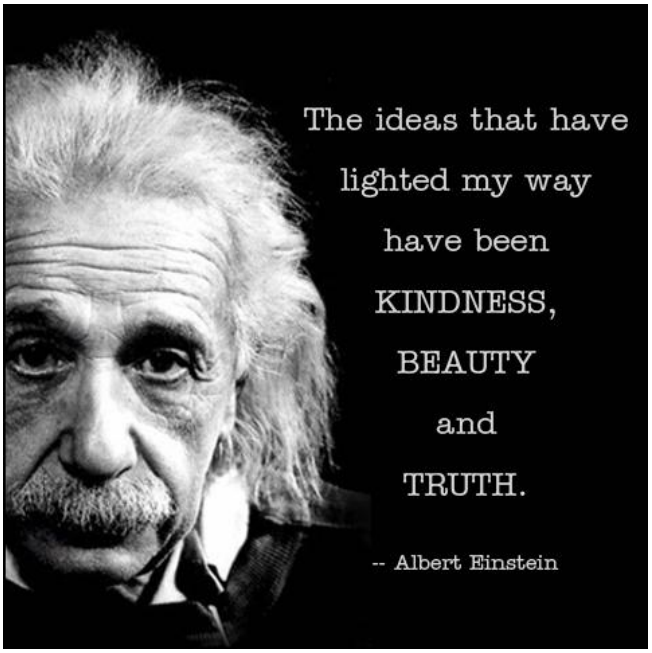

Figure1. *KINDNESS, BEAUTY and TRUTH [4]*

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[3] Springer J. Geometric Distribution of Path and Fine Structure. Progress in Physics, 2013, v. 4, 83–84

[4]https://www.pinterest.com/pin/kindness-beauty-and-truth-word-quotes--245516617159103346/

APPENDIX

Starting with the equation

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

We add unit on both sides of the Eq.

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

We sum both factors on the left

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

We multiply by a factor one the left side of the Eq.

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

We rearrange the left side of the Eq.

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

We further rearrange the left side of the Eq.

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

And finally

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

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