Comment on Traill's Fine Structure Constant Derivation

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Abstract

In the last years different models for the structure of the electron have been proposed. Among these structure proposals is *Traill*'s very promising approach of spherically spiraling waves running from the particle center and towards the center.

Number 13 is an important *Fibonacci* number. It is the protofilament number of tubulin microtubules and in this way connected to human consciousness. The following quadratic equation with a constant term of about 13 is connected to the circle constant π [1]

$$x^2 + x - 13.01119705 = 0 \tag{1}$$

with solutions
$$x_1 = \pi; \quad x_2 = -(\pi + 1) \tag{2}$$

where $-x_1 \cdot x_2 = \pi(\pi + 1) = 13.01119705 \ldots$

Interestingly, this number is found in the recent derivation of *Sommerfeld*'s reciprocal structure constant by *Traill* [2], but it was not recognized as π-based. Finally we get for α^{-1}

$$\alpha^{-1} = 4\pi^3 + \pi(\pi + 1) = 137.0363038 \ldots \tag{3}$$

This value is marginally overestimated in contrast to the CODATA recommended value [3]

$$\alpha^{-1} = 137.035999084(21) \tag{4}$$

Spherically spiraling waves from the particle center and towards the center as model for the particle may indeed be corrected for a small offset that may arise because the waves never quite reach the origin (1/*r* dependence of *Traill*'s wave function).

By using our reciprocity relation between α^{-1} and *Guynn*'s relative galactic velocity $\beta_g = \frac{v_g}{c}$ [4] [5] we can express also β_g by a solely π-based approximation

$$\beta_g \approx \frac{1}{\pi^3(4\pi^2 + \pi + 1)} = 0.00739374 \ldots \tag{5}$$

In this way, α^{-1} respectively α as well as β_g are solely defined through the circle constant indicating the importance of geometry in all physical considerations. The result supports a holographic spinor approach in describing elementary particles.

However, an accurate approach explaining *Sommerfeld*'s α constant was given by *Guynn* [5]. It can be rewritten in a form that indicates a nice reciprocity relation using the galactic rotation velocity v_g due to *Thomas* precession [4] [5]

$$\alpha = \frac{2\pi}{c}\sqrt{|v_g|}\ \left(\frac{1}{\varphi'}\sqrt{|v_g|} + \frac{\varphi' \cdot k_2}{\sqrt{|v_g|}}\right) = 0.0072973525663 \tag{6}$$

where $\varphi' = (2 - 2^{1/3})^{3/2} = 0.63667394565092 \approx \frac{2}{\pi} = 0.636619772$ (7)

and $k_2 \equiv m/s$ is a dimension-preserving factor [5]. φ' is related to the maximum difference velocity β_m

$$\varphi' = \sqrt{2} \cdot \beta_m \tag{8}$$

Sommerfeld's structure constant is indeed not a fine-structure constant, but a constant being relevant for systems from particle scale to galactic scale.

From our icosahedral *Moebius* ball electron model, where 12 wavy *Moebius* slings are spiraling towards the particle center and away from the center, an approximation of the inverse *Sommerfeld* α^{-1} constant can be obtained by the following relation that contains elements of icosahedron mathematics as well as the golden mean [6] [7]

$$\alpha^{-1} \approx \frac{4}{5} \cdot 171 + \varphi^3 = 136.8 + 0.236067976 = 137.03606\ldots \tag{9}$$

where $\varphi = \frac{\sqrt{5}-1}{2} = 0.6180339887\ldots$ is the golden mean.

Another relation for α^{-1} from our *Moebius* ball electron model can be obtained, where r_{sling} is the radius of the slings and r_c is the *Compton* radius

$$\alpha^{-1} \approx \frac{1}{2\varphi}\left(\frac{r_c}{r_{sling}} + 12\right)^2 \tag{10}$$

Number 171 in relation (9) is a coefficient of the icosahedron equation [8] and can be approximated by the interesting quadrat of reciprocal numbers

$$(13 + \frac{1}{13})^2 = 13.07692308^2 = 171.0059172\ldots \tag{11}$$

We may compare this result with the roots of the depressed quartic polynomial

$$x^4 - (\frac{n}{a} - 2)\, x^2 + 1 = 0 \tag{12}$$

which can easily be calculated by the relation

$$x_i = \pm\sqrt{\frac{n}{2a} - 1 \pm \sqrt{\left(\frac{n}{2a} - 1\right)^2 - 1}} \tag{13}$$

with the result $x_{3,4} = \pm x_1^{-1}$. For n = 173, a = 1 we obtain

$$x_1 = 13.07647321898 \tag{14}$$

$$x_3 = x_1^{-1} = 0.07647321898 \tag{15}$$

$$x_1{}^2 = 170.99415 \ldots \tag{16}$$

I became aware of this golden number $x_1 = 13.07647321898$ by *Mykola Kosinov* and say thank you very much.

The anomalous part of the gyromagnetic factor of the electron Δg_e can be approximated by a relation indicating golden mean and icosahedron mathematics of the *Moebius* ball electron [6]

$$\Delta g_e \approx \left(\frac{12}{13}\right)^{\frac{3}{2}} \frac{1}{\sqrt{5}\cdot(13+\frac{1}{13})^2} = 0.002319319 \tag{17}$$

However, the gyromagnetic factor of the electron was recently precisely derived by *Guynn* [5].

Finally, we would like to draw attention to another number near number 13 [6]

$$\sqrt{2\varphi\alpha^{-1}} = 13.01482999 \ldots \tag{18}$$

Vice versa for the value of α^{-1}we obtain the approximation

$$\alpha^{-1} \approx \frac{13.01483038^2}{2\varphi} \tag{19}$$

References

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