Fine structure constant in speculative relations

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Abstract. The aim of this article is to question: ***Is it possible to express fine structure constant only through 2 dimensionless physical constants?***

The idea exploited is that the fine structure constant **α** can be expressed only through mathematical constants.

Example from [1]:

$$\alpha=\cos(\pi/137)\cdot\tan(\pi/137\cdot 29)=0.0007905279 \qquad (1)$$

or inverse fine structure constant: $\acute{\alpha}=1/\alpha=137.035999787$

Or example from [2]:

$$\acute{\alpha}=4\pi^3+\pi^2+\pi\,1=\pi(4\pi^2+\pi+1)=137.036\,303\,7\ldots \qquad (2)$$

Or example from [3]:

$$\alpha=\Gamma^2\exp(-\pi^2/2) \qquad (3)$$

where Γ is order: $\Gamma=1+\alpha(1+\alpha/\pi')(1+\alpha/\pi'^2)(1++\alpha/\pi'^3)(1+\ldots=1.00730582951590$
then: $\alpha=1.00730582951590^2\cdot 0.007719188336=0.0072973525686539$

or: $\acute{\alpha}=1/\alpha=137.03599909583$

According to the latest report published with CODATA [4]

$$\acute{\alpha}=137.035\,999\,074\,(44)$$

and proton/electron mass ratio is:

$$\mu=1836.152\,672\,45\,(75)$$

Approximate values here are calculated using multiple equations involving only mathematical constants *e* and *π*, however, despite the elegant look, they do not have mathematical and physical explanation and will therefore be listed here as speculative equations:

$$\alpha'=\left[e^{2\pi}+4\pi+1/4\pi+1/(4\pi)^2+1/(8\pi)^3\right]/4=137.035999794 \qquad (4)$$

$$\alpha'=\left[e^{2\pi}+4\pi+1/4\pi+1/(4\pi)^2+1/129^2\right]/4=137.035999069 \qquad (5)$$

$$\alpha'=\left[e^{2\pi}+4\pi+1/4\pi+1/(4\pi)^2+1/(8\pi+\pi/8-1/e^{2\pi})^3\right]/4=137.035999075 \qquad (6)$$

Fine structure constant is a dimensionless ratio between the physical quantities as well as many others and after 2π it is the most common. Its exact amount would be calculated if the entire functioning of the universe would be mathematically described.

In this paper we will assume that all the previous formulas are speculative, so we will use the CODATA value of the inverse fine structure constant, $\acute{\alpha}$ **= 137.035999074.** Let us mention some relations in which it appears:

$$\acute{\alpha}=q_{pl}^{2}/e^{2} \qquad 7$$

$$\acute{\alpha}=\alpha_{G}^{1/2}a_0/l_{pl} \qquad 8$$

$$\acute{\alpha}=1/4\pi R a_0 \qquad 9$$

$$\acute{\alpha}=2ch\varepsilon_0/e^{2} \qquad 10$$

$$\acute{\alpha}=4c/2\pi h K_j^{2} \qquad 11$$

$$\acute{\alpha}=2\pi m_e c a_0/h \qquad 12$$

q_{pl} – Planck charge, e – charge unit, α_G - gravity coupling,
a_0 – Bohr radius, l_{pl} - Planck length, R - Rydberg constant, c - speed of light,
h- Planck constant, ε_0 – electric constant, K_j – Josephson constant,
m_e - electron mass, m_{pl} - Planck mass

or a relation in which only dimensionless physical constants appear [5].

$$\acute{\alpha}=\sqrt{[\ln 2(\ln N \ln\gamma-1)/\ln\mu]} \qquad 13$$

N – large number**, N=6.387077E+121** from [5],
γ - the ratio of a neutron/proton mass , **γ=1.001 378 419 17 (45)** from [4]

Why am I discussing speculative relations and relations in which dimensionless and dimensional constants appear? I hope that it is relaxing to read something speculative, even though it is impossible to express the fine structure constant using only mathematical constants, on the way as in **(1-6)**.

Let's analyze relations **7-13** in regard to dimensional and dimensionless physical constants in them.

There are:
2 dimensional constants in (7) and (9)
2 dimensional and 1 dimensionless constant in (8)
3 dimensional constants in (11)
4 dimensional constants in (10) and (12)
3 dimensionless constants in (13)

This leads to a logical and theoretically important question:

Is it possible to express fine structure constant only through 2 dimensionless physical constants?

It seems logical that it is, and once it is done, it would be a big step towards understanding the origin of the fine structure constant.

References:

1. Wikipedia – *Fine-structure constant*
2. Péter Várlaki, László Nádai, József Bokor - Number Archetypes and "Background" Control Theory Concerning the Fine Structure Constant - Acta Polytechnica Hungarica
3. hansdevries@chip-architect.com
4. CODATA internationally recommended values of the Fundamental Physical Constants, (2010) values of the constants.
5. Branko Zivlak - *Neutron, proton and electron mass ratios, viXra:* 1211.0090