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Abstract

The de Vries formula, discovered in 2004, is undeniably accurate to current experimental and theoretical measurements (3.1e-10 to within CODATA 2014's value [1], currently 2.3e-10 relative uncertainty). Its Kolmogorov Complexity is extremely low, and it is as elegant as Euler's Identity formula. Having been discovered by a Silicon Design Engineer, no explanation is offered except for the hint that it is based on the well-recognised first approximation for g/2: $1 + \alpha/2\pi$.

Purely taking the occurence of the fine structure constant in the electron: in light of G Poelz [2] and Dr Mills' [4] work, as well as the Ring Model [9] of the early 1900s, this paper offers a tentative explanation for α as being a careful dynamic balanced inter-relationship between each radiated loop as emitted from whatever constitutes the "source" of the energy at the heart of the electron. Mills and the original Ring Model use the word "nonradiating" [6] [7] which is is believed to be absolutely critical.

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1 Alpha and the de Vries Formula

A fascination with alpha also led me to the de Vries formula [3]. Sadly, quantum-mechanics-trained physicists will typically instantly dismiss the de Vries formula as "numerical nonsense". However, to a software engineer and *especially* one with a background in reverse-engineering and derivation of knowledge, the Kolmogorov Complexity and recursive iterative elegance of the de Vries formula is an instant neon flashing sign. There are a number of ways to express the formula:

$$\alpha = \Gamma^2 e^{-\frac{\pi^2}{2}} \tag{1}$$

where

$$\Gamma = \sum_{n=0}^{\infty} \frac{\alpha^n}{(2\pi)^{T_n}} \tag{2}$$

and T_n is the Triangular Number

$$T_n = \sum_{k=1}^{n} k \tag{3}$$

If Gamma is expressed recursively it may be formulated in the original more Maclaurin-like (radiative series) form:

$$f(x) = 1 + \left(\frac{\alpha}{(2\pi)^x}\right) f(x+1) \tag{4}$$

where, simply,

$$\Gamma = f(1) \tag{5}$$

This type of recursive relation is explored further by Jay Yablon [5] Section 16, in which he notes the structural similarity of the recursive formula to the recursive E.M. time-dilation equations that he developed.

The only problem with the formula is: despite it being the only simple numerical formula which is within range of the current experimentally-observed and theoretically-calculated values of alpha according to the current Standard Model, there is absolutely no explanation given or offered as to why it works, beyond the comment that it contains the well-recognised pattern of $1+\alpha/2\pi$ as part of the recursive / iterative equation. The undeniable accuracy however is simply too good to just dismiss out-of-hand, leading to an investigation for potential explanations.

2 What is the possible relevance of the de Vries Formula?

This is a crucial question. What possible link to reality could the de Vries formula have? If we look again at the recursive representation for Γ 4 and restrict it to just one iteration ($f(2) = 1$, temporarily) we have the ever-so-familiar $1+\alpha/2\pi$ which is recogniseable as a first approximation of the electron magnetic moment. However, what about the next level? That's $1 + \alpha/(2\pi)^2$, and so on.

When we look at G Poelz's paper [2] he describes the synchotronic radiation as outwardly-propagating in a cone, but that it is "re-absorbed" (i.e. is nonradiating) i.e. crucially it is *kept* within the toroidal (or whatever) arrangement that he envisages the E.M. field to be on.

The question that I immediately asked myself on re-reading his paper very recently: what happens to that E.M. radiation after it goes round the first loop? Does it somehow simply... stop? Of course it doesn't. What I propose is that it simply keeps going round, and round again, and again, but on each loop its distance from its original source will be yet another factor of 2π further away! Huh. funny that, because that's exactly the effect of increasing the value of x in the recursive function: we get an extra 2π in $1 + \alpha/(2\pi)^x$ term for each increment of x.

Now, taking a leaf out of both Jay Yablon's and Dr Randall Mill's books, we surmise that these E.M. factors not only affect the original source (the epicentre, i.e. the photons themselves within the "particle"), but that they also *interact with each other in a phase-coherent fashion* Thus we are *required* to multiply the terms together in this bizarre recursive fashion, as they represent each new emitted synchotronic radiation "thing" from the epicentre not only with the epicentre but also cumulatively with each other, thus providing us with the fascinating occurrence of the Triangular Number in the fully-expanded series.

In essence: each time the epicentre radiates yet another blast of synchotronic radiation (to use G Poelz's terminology), that radiation *literally* propagates forever, on an infinite phase-coherent frictionless loop within the nonradiating toroidal field, interacting in phase-lock with all other "blasts" and the epicentre itself to iteratively and dynamically create this stable ratio we call α until such time as the particle "decays" or the end of the Universe is reached (whichever is sooner).

3 Early truncation of the series

Now, the bit that I found particular fascinating was when the series was truncated early (for example, a newly-created particle is so short-lived that its lifecycle may be measured in single-digit rotations or "spins") It's been speculated for a long, long time that α is not a constant. If we modify the recursive equation so that the total number of terms is a fixed quantity instead of infinite ($x > 5$ returns 1.0 for example), this would be a *practical* mathematical representation of the formerly-mentioned ultra-short-lived particle's conditions, we find that running the iterative loop results in a smaller value of alpha. However: we do note that each additional term begins to add extra accuracy spectacularly quickly, even when the number of iterations is reduced to 2 or 3 (i must always be less than or equal to x in the python implementation alpha.py [8]). We therefore speculate that it is the absolutely ultra-short-lived particles such as the really high-energy ones that *might* genuinely have a different value for α, but that for most practical intents and purposes the difference is in the fifth to sixth decimal place. It's nothing like the proposed 1/128 that has been seen discussed in some papers.

When it comes to electrons orbiting protons, I would again expect the "nonradiating" condition to apply (has anyone else thought of that, in relation to the electron-proton orbits?). Otherwise, the electron would slow down in its orbit of the proton and come to a complete stand-still as the energy which gave it its orbital velocity dissipated entirely through radiation!

Thus we correspondingly expect α to naturally occur here (as it in fact does), representing (as it does) the iterative Triangular phase-coherent accumulation of the non-radiating E.M orbiting fields with themselves and with the two particles, confined as all that energy is to a circular (or Toroidal) frictionless path.

4 Discussion

The fine structure constant reoccurs in dozens of different places in nature, and is critical to our understanding of the universe, electronics and more. It's remained elusive for such a long time that only has the accuracy of the experimental and theoretical work carried out recently been so high that all other formulae with no sound theoretical background of the past century fall away except for one 1. In 2004 the CODATA values for α were simply not accurate enough, but now, in 2016, to within 7e-11 of the current relative uncertainty of 2014 CODATA [1] the de Vries formula simply cannot be ignored any longer.

Whilst in this paper I took Poelz's work, Mills and the Ring Model as the theoretical basis for a tentative explanation for the de Vries formula, it is likely that the same recursive approach could work within the framework of the Standard Model as well.

The importance of the nonradiating condition cannot be underestimated. Without that condition as a theoretical basis, whatever is inside the electron would radiate outwards and the entire particle would vanish. That the electron does *not* simply vanish but remains stable would tend to support the hypothesis that, if there is in fact anything radiating within the electron, it's doing so in a self-contained "shell": something that Poelz goes to some lengths to explore. In fact, Dr Mills uses "nonradiating" as a boundary condition on Maxwell's Equations to great effect, giving sound theoretical figures for the electron's magnetic moment and other statistics to almost within CODATA 2014 values, thus supporting the original "nonradiating" hypothesis.

If we can accept that whatever is inside the electron does not radiate outwards but instead remains within the Compton Radius of the electron, it is not so hard to envisage that that energy cannot go anywhere except round in an infinite loop, and that each loop interacts to infinity with all other prior loops. **This is the key insight that has been missing from all other theories of the electron and other particles, to date**.

References

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