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 was 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 either 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, or the recursive application of Special Relativity Corrections (yet to be determined which). Mills and the original Ring Model use the word "nonradiating" [6] [7] which is is believed to be absolutely critical.

Contents

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,

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

We note in passing that this is remarkably similar to the expression for the anomalous dipole moment which we also note is recursive [10]:

$$a_e = \sum_{n=1}^{\infty} a_e^{(2n)} \frac{\alpha}{(2\pi)^n} \qquad (6)$$

This type of recursive relation is explored further by Jay Yablon [5] Section 16, in which he notes the structural similarity of the recursive variant 4 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, especially given its remarkable similarity to the (also recursive) anomalous dipole moment equation, 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   Iterative, recursive application of Relativity Corrections

A second explanation presents itself from hints from McMahon's discourse on relativity [11], Jay Yablon's work on time dilation [5], and that Mills has a section in his book, "Special Relativistic effect on the Electron Radius" (page 113) [4]. We note with extreme interest that the corrective factor comes out to $1/2\pi$ when $v = c$, particularly in light of McMahon's insights.

We ask: what would the corrective factor be, after a second loop? More specifically: if that corrective factor $1/2\pi$, is representing a special relativity correction to the radius of the electron, and it needs to be applied *recursively* throughout the electron anomalous dipole moment relationship, then we might have a real avenue of exploration here.

4   Application to Electron Orbits

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) infinitely-looped frictionless path known as an "orbital shell". Or the cumulation of Special Relativistic corrections.

5   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 that also have that critical characteristic of low Kolmogorov Complexity 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. In speculating as to why the recursive relationship has not been noticed by theoretical physicists of the past century, nor fully cognised the significance when it was first brought to light in 2004, respectfully I can only surmise that it would be someone with a background in Computing, where recursion features strongly as a way to reduce code size and achieve simplicity, as well as secondary interests in particle physics *and* reverse-engineering (aka "knowledge-derivation from reduced or access-capacity-restricted information sources" aka "code debugging") who would notice the significance.

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.

Alternatively, the other theory is that special relativity corrections need to be applied not just between the factors contributing to the electron anomalous dipole moment but also repeatedly down the line in all the contributions [10] such that they will stack up in the Triangular series fashion expressed elegantly in one form of the de Vries formula.

References

[1] Peter J. Mohr, David B. Newell, Barry N. Taylor, *CODATA Recommended Values of the Fundamental Physical Constants: 2014*,

arxiv:1507.07956, July 30, 2015.

[2] G Poelz, *On the Wave Character of the Electron*

arXiv:physics/1206.0620v13.

[3] Hans de Vries, *An exact formula for the Electro Magnetic coupling constant.*

http://chip-architect.com/news/2004_10_04_The_Electro_Magnetic_coupling_constant.html

October 4, 2004.

[4] Dr Randell L Mills, *The Grand Unified Theory of Classical Physics*,

http://brilliantlightpower.com/book-download-and-streaming/, September 2016 Edition.

[5] Jay R Yablon, *Electromagnetic Time Dilation and Contraction, and a Geometrodynamic Foundation of Classical and Quantum Electrodynamics*,

http://vixra.org/abs/1609.0387, vixra:1609.0387, 26 September 2016.

[6] Wikipedia, *Nonradiation condition*, https://en.m.wikipedia.org/wiki/Nonradiation_condition.

[7] Leigh Page, *A Generalization of Electrodynamics with Applications to the Structure of the Electron and to Non-Radiating Orbits*,

http://journals.aps.org/pr/abstract/10.1103/PhysRev.18.292,

DOI:https://doi.org/10.1103/PhysRev.18.292, 1 April 1921.

[8] Luke Kenneth Casson Leighton, *Implementation of de Vries formula for alpha in python 2*,

http://lkcl.net/reports/fine_structure_constant/alpha.py.

[9] Wikipedia, http://en.wikipedia.org/wiki/Toroidal_ring_model.

[10] Masashi Hayakawa, *"Theory of Anomalous Magnetic Dipole Moments of the Electron"*, equation 2.27, Springer Tracts Mod.Phys. 256 (2014) 41-71 (2014) DOI: 10.1007/978-3-642-45201-7_2

http://dx.doi.org/10.1007/978-3-642-45201-7_2

[11] Mr Casey Ray McMahon "Fine structure constant solved and new relativity equations– Based on McMahon field theory."

https://gsjournal.net/Science-Journals/Research%20Papers-Quantum%20Theory%20/%20Particle%02Physics/