

Evidence Supports Jeff's Significant Work on 1/137

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Abstract

As a letter, it introduces and positively evaluates Jeff Yee's important contribution to the theoretical calculation of the fine-structure constant. The expression $1/\alpha = 4\pi^3 + \pi^2 + \pi = 137.036$ relies on a rigorously grounded physical model and strict mathematical derivation. We demonstrate that it naturally emerges from B. Feng theory's 5-D framework. Results derived from two independent higher-dimensional approaches (perspectives 1 and 2) within B. Feng theory provide separate corroborations for this conclusion.

Keywords

B. Feng Theory, Fine-Structure Constant, Theoretical Calculation, Higher-Dimensional Spacetime, π , α

1. Introduction

Jeff Yee's 2019 work is both insightful and highly commendable. It represents an exceptionally significant advance in the calculation of the fine-structure constant, even though it has only appeared in preprint form to date.

Since 1929, mainstream attempts to explore the mathematical origin of the fine-structure constant have numbered no fewer than 150, with independent investigations by non-professional researchers exceeding 500. Many of these efforts have achieved impressive numerical precision, and some of the relatively better works have incorporated special mathematical constants. Nevertheless, as most of them lack or have no clear physical motivation and rigorous mathematical derivation, these studies, in general, still fall into the category of unfounded numerical fitting. And this situation was not altered until the emergence of Jeff Yee's work [1].

The core conclusion put forward by Jeff on the fine-structure constant, α , is simply as:

$$1/\alpha = 4\pi^3 + \pi^2 + \pi \approx 137.036$$

This result achieves a high relative accuracy of +2.2 ppm.

This relation is valuable not only for its concise mathematical form and accurate computational result; more importantly, it was rigorously derived by Jeff from a body-centered cubic-like spherical physical model, based on his deep understanding of electromagnetic wave propagation and his profound insight, which involves no artificial numerical fitting or *ad hoc* tuning. Given its high precision, this relation is highly likely to reveal the underlying physical reality. All truth is relative. If Jeff's relation were dismissed as mere coincidence solely because the Standard Model treats α only as a precisely measurable quantity, such a conclusion would be arbitrary and unfair from an impartial historical perspective of scientific development, and would only impede scientific progress. Therefore, Jeff's relation ought to be accorded its rightful place in scientific discourse. At any rate, to label Jeff's work as nothing more than a coincidence is rash and scientifically irresponsible.

2. Perspective 1

Based on the guidance of Einstein's relativity regarding the influences of both uniform and accelerated motions on spatial properties, B. Feng theory *posits that* time possesses two dimensions and establishes a material framework for five-dimensional spacetime $\mathbb{R}^5$. According to high-dimensional geometry,

$$S_4 = (8/3)\pi^2 R^4, \quad V_4 = (1/2)\pi^2 r^4, \quad S_3 = 2\pi^2 R^3, \quad V_3 = (4/3)\pi r^3$$

In B. Feng theory [2] [3], the relation,

$$R = \left(\Omega^2 + (ct)^2 \right)^{1/2} = \left(r^2 + r^2 \right)^{1/2} = 2^{1/2} r,$$

is introduced as an *axiomatic boundary condition* for the variable-modulus projection, under which the spatial and temporal components of the high-dimensional radius are equivalent. So,

$$S_4/V_4 = 64/3, \quad S_3/V_3 = 3 \times 2^{1/2} \pi$$

Since an n -dimensional spherical space is equivalent to an $(n+1)$ -dimensional Euclidean space, the notations S_4 and S_3 can be re-expressed as $\mathbb{S}_5$ and $\mathbb{S}_4$ in the Euclidean space framework, respectively. Thus, the projection coefficient from higher dimensions to lower dimensions can be expressed as:

$$\mathbb{S}_5/V_4 = 64/3, \quad \mathbb{S}_4/V_3 = 3 \times 2^{1/2} \pi, \quad \mathbb{S}_5/V_3 = 64 \times 2^{1/2} \pi$$

This represents the idealized variable-modulus or projection result (projection coefficient) in flat space. However, assuming that Einstein's description of spacetime curvature holds for $\mathbb{R}^5$, there exists a curvature coefficient k_i that influences the projection. Research within B. Feng theory has revealed a theoretically calculable relation for this curvature coefficient, where, $\mathcal{G} = \pi / (3 \times 2^{1/2})$,

$$k_1 \approx 2 \sin(\mathcal{G}/2) / \mathcal{G} = 0.977309770, \quad k_1 k_2 = 2 \times 2^{1/2} / (3k_1) \quad k_2 \approx 0.98709626$$

Accordingly, the projection coefficients revised by the curvature coefficients

can be written individually as: $64k_1/3$, $3 \times 2^{1/2} \pi k_2$ and then,

$$\mathbb{S}_5/V_3 = 64 \times 2^{1/2} \pi k_1 k_2 = 64 \times 2^{1/2} \pi \times 2 \times 2^{1/2} / (3k_1) = 64 \times 2 \times 2\pi / (3k_1)$$

and further rewrite it as:

$$\mathbb{S}_5/V_3 = 2 \times 64 \times 2\pi / 3$$

On this basis, B. Feng theory derives the computational formula for the elementary charge and yields the corresponding calculated results,

$$q^2 = (\tilde{3}/32) \varepsilon_0 c \hbar = (1.60149 \times 10^{-16} \text{ C})^2$$

The result achieves high precision, with an error of $q - 0.042\%$.

Substituting this charge calculation formula into the evolved expression of the fine-structure constant defined by Sommerfeld yields its theoretical formula,

$$1/\alpha = S_5/V_3/2 = 64 \times 2\pi / 3$$

Then the result achieves a cumulative error of $+0.085\%$.

It is evident that this is a mathematically precise formula for the fine-structure constant originating from higher dimensions. This first scheme as a derivative of the charge calculation formula rather than a result specifically derived for the study of the fine-structure constant, there is absolutely no premise or motivation for fitting in its derivation. This formula has one-fourth the computational precision of Jeff's, yet the two are roughly consistent.

Some current astronomical observations (e.g., quasar absorption spectra) suggest that α may vary slightly on cosmological scales. However, the calculations underlying these conclusions still rely on the definition of α , which involves the elementary charge. As such, these analyses inherently involve the physical quantity of electric charge. In contrast, the aforementioned results from B. Feng theory clearly demonstrate that the electric charge itself varies with the properties of spacetime.

3. Perspective 2

From frame $\mathbb{R}^5$, it is the compactification of five-dimensional space and the derivation of geometric measures are presented as follows:

3.1. Symbol Definitions and Fundamental Geometric Formulas

Let $S_n(\cdot)$ denote the scalarization operator that extracts the intrinsic geometric measure of an n -dimensional compact Riemannian manifold, yielding a dimensionless scalar. S_n denotes the measure of the unit n -dimensional topological sphere $\mathbb{S}^n$. According to higher-dimensional geometry, the intrinsic geometric measure of the unit n -dimensional sphere is given by,

$$S_n = \frac{2\pi^{(n+1)/2}}{\Gamma\left(\frac{n+1}{2}\right)}$$

For the low-dimensional spheres relevant to this work, the measures are,

$$S_1 = 2\pi, \quad S_3 = 2\pi^2$$

3.2. Topological Compactification of 5D Space

Under the physical constraint of unidirectional propagation of electromagnetic waves, the five-dimensional space $\mathbb{R}^5$ can only be topologically compactified into the product manifold,

$$S^3 \times S^1$$

Other manifolds (such as $S_2, S_4, S_2 \times S_2, S(S^3), S(S^3/\mathbb{Z}_2)$ and even higher-dimensional ones like S_5 and $S_4 \times S_1$) are geometrically excluded due to incomplete homology groups (either $H_1 = 0$ or $H_3 = 0$). This is precisely the fundamental reason why “electromagnetic unidirectionality” as a purely geometric constraint uniquely selects $S^3 \times S^1$. The detailed reasons are as follows:

S_2 (2-sphere): Only $H_0(S_2) \cong \mathbb{Z}$ and $H_2(S_2) \cong \mathbb{Z}$, with the middle-dimensional homology group $H_1(S_2) = 0$. It fails to satisfy the multi-dimensional homology matching required for five-dimensional compactification; moreover, a 2-dimensional manifold cannot serve as a candidate internal space for a five-dimensional theory; **S_4 (4-sphere):** Only $H_0(S_4) \cong \mathbb{Z}$ and $H_4(S_4) \cong \mathbb{Z}$, with homology groups of all other dimensions vanishing. It completely fails the middle-dimensional requirement imposed by Poincaré duality; **$S_2 \times S_2$ (product manifold of two 2-spheres):** Its homology groups are $H_0 \cong \mathbb{Z}$, $H_1 = 0$, $H_2 \cong \mathbb{Z} \oplus \mathbb{Z}$, $H_3 = 0$, $H_4 \cong \mathbb{Z}$. The missing middle-dimensional homology renders it incompatible with the compactification condition; **$S^3/\mathbb{Z}_2$ (the 3-sphere with antipodal points identified):** Its homology groups yield $H_1 = 0$, violating Poincaré duality, this indicates that singularities break the unidirectionality condition; **B^4 (the 4-ball with boundary S^3):** The propagation direction becomes ambiguous at the boundary, violating the requirement of unique compactification. **Only $S^3 \times S^1$** fulfills the homology matching conditions across all dimensions—it satisfies Poincaré duality for the five-dimensional framework. This is precisely why “electromagnetic unidirectionality” (a purely geometric constraint) uniquely selects $S^3 \times S^1$ as the internal compactified space.

By the product property of Riemannian measures—the measure of a product manifold equals the scalar product of the measures of its factor manifolds—we have,

$$S(S^3 \times S^1) = S_3 \cdot S_1 = 2\pi^2 \cdot 2\pi = 4\pi^3$$

3.3. Total Measure

Considering the special symmetry breaking ($\mathbb{Z}_2$ parity constraint) of five-dimensional spacetime under unidirectional electromagnetic propagation, the intrinsically four-dimensional compactified manifold $S^3 \times S^1$ as a whole undergoes decoupling and rearrangement of its intrinsic measure on its constituent submanifolds. Mathematically, this rearrangement manifests as a linear superposition of

the measures of the individual submanifolds. When the full symmetry group G is broken to its subgroup $H = \mathbb{Z}_2$, the corresponding homogeneous space G/H undergoes a geometric decomposition. In our case, under the $\mathbb{Z}_2$ constraint, the tangent space or metric tensor of the five-dimensional compactified manifold $S^3 \times S^1$ decomposes into a direct sum of orthogonal subspaces:

$$T(S^1)T(S^3 \times S^1) \cong T(S^3).$$

Owing to $\mathbb{Z}_2$ breaking, the measure forms associated with the submanifolds and the product manifold become mutually independent, and the total geometric measure is given by their combined sum, here they can be grouped into a set, $G = \{S^1, S^3, S^3 \times S^1\}$. Analogously, in physics one frequently employs logarithmic measures or entropy, which exhibit additivity. In the context of “information loss” or reduced degrees of freedom induced by $\mathbb{Z}_2$ breaking, the total information (or total measure) of the system can be expressed as a linear sum of the information contents of the independent subsystems.

Based on the above reasonings, the total measure Ω_{total} is introduced here as the sum of the intrinsic geometric measures corresponding to S^3 , S^1 , and $S^3 \cdot S^1$, yielding,

$$\Omega_{total} = S(\{S^1, S^3, S^3 \times S^1\}) = S(S^1) + S(S^3) + S(S^3 \times S^1) = 2\pi + 2\pi^2 + 4\pi^3$$

3.4. Effective Measure (Halving Rule)

In a standard isotropic spacetime, all possible propagation directions of the electromagnetic field form its state space. Mathematically, this state space can be represented by a manifold such as S^3 or S^1 , where the measure (geometric volume element dV) encodes the statistical weight of all possible microscopic configurations in that state. Without any constraints, the system is fully symmetric, and the corresponding group actions (e.g., the 3D rotation group $SO(3)$ or the Lorentz group $SO(3, 1)$) ensure the completeness of the measure.

However, when the constraint of unidirectional electromagnetic propagation is imposed (e.g., electromagnetic waves are restricted to a specific chirality or direction), the original full symmetry group is broken. Mathematically, this corresponds to imposing a selection rule or projection constraint on the group action. Specifically, unidirectional propagation is equivalent to requiring the system to satisfy a $\mathbb{Z}_2$ parity constraint, which excludes all group elements that would support backward propagation or opposite chirality. In group theory, restricting a large symmetry group G (describing full symmetry) to a subgroup H (describing the unidirectional constraint), or imposing a dichotomous constraint, partitions the geometric space generated by G into a set of cosets.

Thus, enforcing unidirectionality eliminates all backward or reversed states, which amounts to truncating the group orbits by half. a) Let the original geometric measure (corresponding to the full orbit volume of group G) be V_{full} ; b) Upon imposing the unidirectionality constraint (i.e., introducing $\mathbb{Z}_2$ symmetry breaking), the originally connected manifold is split into two disjoint components, such

as forward and backward propagation. Since the physical system permits only one component, the effective measure space is reduced to half its original volume. Mathematically, this corresponds to normalizing the original geometric measure by a factor of $1/2$. This is analogous to projection operators in quantum mechanics: projecting onto a definite spin or polarization direction in a fully symmetric space reduces the probability amplitude by a factor of $1/2$. Here, the geometric measure plays the role of a classical probability amplitude.

In the present context, to S^1 and S^3 , these manifolds represent compactified substructures in five-dimensional spacetime that naturally support two-way symmetry. Under global unidirectional electromagnetic constraints, their measures are halved according to the above group-theoretic rule: $S_1 \rightarrow S_1/2$, $S^3 \rightarrow S^3/2$. But no halving of $S^3 \times S^1$.

4. Conclusion

As a product manifold $S^3 \times S^1$, it maintains an orientation-agnostic global topological structure under unidirectional constraints. Consequently, symmetry breaking fails to generate a twofold reduction in volume, and the original measure is conserved. Thus, the total effective measure Ω_{eff} is then had form as,

$$\Omega_{eff} = S_1/2 + S^3/2 + S(S^3 \times S^1) = \pi + \pi^2 + 4\pi^3$$

Perspectives 1 and 2, derived from two distinct higher-dimensional frameworks, independently corroborate Jeff's findings and lead to the conclusion that the fine-structure constant α is a purely geometric constant.

5. Supplementary Remarks and Discussions

The measure construction is centered on the five-dimensional compactified structure $S^3 \times S^1$ and involves only S^1 and S^3 . The 2-sphere S^2 , 4-sphere S^4 and others do not participate in the corresponding causal structure or measure composition, hence their measures do not appear in the total measure sum.

In this work, the conventional manifolds S_1 , S_3 , and $S(S^3 \times S^1)$ are redefined to denote an unified geometric measure, thus acquiring rigorous dimensionless characteristics, rather than length, area, volume, etc. units, within the same manifold. Therefore, no issue of inconsistent dimensionality arises.

Lastly, I would like to emphasize that, in terms of methodology, perspective 1 focuses on fundamental physical truth through step-by-step projective dimensional reduction from higher dimensions, in which the factors follow innate multiplicative logic; and the perspective 2 of B. Feng theory adopts the high-dimensional compactified topological geometric measure method. By contrast, Jeff's theory starts directly from observable three-dimensional reality, collects traces left by higher dimensions-like in ordinary 3D space, and restores the intrinsic nature of things through cumulative summation.

As for α , deviations in B. Feng theory (perspective 1) may arise from non-exhausted higher dimensions, because we cannot exclude the existence of accelera-

tion variation with an extremely small probability. Where then, would errors in Jeff's theory originate? However, from the results in the perspective 2, no errors arise due to its mathematical rigor. Its only possible source of error is thus identical to that of the perspective 1, the idealized $\mathbb{R}^5$ model. Minor differences in the resulting error due to different methods or derivation paths are understandable. Clearly, the results demonstrate that the perspective 2 follows a shorter derivation path and is therefore superior.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

- [1] Yee, J. (2019) The Relationship of the Fine Structure Constant and pi. *viXra*.
<https://vixra.org/pdf/1905.0396v2.pdf>
- [2] Mei, S.Y. and Mei, Z.H. (2019) Theoretical Calculation and Proof of Electron and Proton Radius. *Journal of Physics & Astronomy*, **7**, 181.
- [3] Mei, Z.H. (2026) Electric Charge and Mass Beauty in Math Style. *Journal of High Energy Physics, Gravitation and Cosmology*, **12**, 303-311.
<https://doi.org/10.4236/jhepgc.2026.121019>