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Advanced B. Feng Theory: A Physical Theory with ppb-Level Precision

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Abstract

Constructed on the framework of curved geometries in five-dimensional and extra five-dimensional spacetime, the B. Feng Theory combines fine-tuning of the magic angle and the mass running rule of parameter k_3. With only a small set of input parameters, it calculates experimentally verifiable fundamental physical quantities including the fine-structure constant, elementary charge, electron mass and proton mass at parts-per-billion (ppb) precision, and maintains strong internal self-consistency. Additionally, the theory puts forward four new physical predictions pending experimental validation. It represents a fundamental physical theory featuring high parameter efficiency and ultra-high computational accuracy.

Keywords

Fundamental Physics, Fine-Structure Constant, 5-D Theoretical Calculation, Parametric Input, First-Principles

1. Introduction

The B. Feng theory constitutes a novel fundamental physical framework concerning the essence of matter, built upon a five-dimensional geometric spacetime. Its elaborate foundational principles are fully elaborated in a monograph [1], while a condensed summary of its core outcomes is presented in a recently published article [2]. This theory remains an evolving system with steadily improving predictive precision. In its early formulation without accounting for spacetime curvature, the theoretical accuracy stood at approximately 4%. After incorporating curved spatial geometry into the formalism, the precision improved drastically to roughly 0.04% - 0.08%. The theory attributes the residual minor discrepancies to low-probability effects originating from hyper-five-dimensional spacetime, whose detailed configurations cannot yet be fully characterized within the current framework. Nevertheless, if we temporarily set aside the strict first-principles paradigm at this point and adopt a general parametric input scheme, only a small set of free parameters is required to push the theoretical precision to the parts-per-billion (ppb) level. The present paper develops this approach in detail.

2. Theoretical Postulates and Benchmark Parameters

2.1. Five-Dimensional Geometric Postulate

A curved five-dimensional spacetime adopts the topology of a quasi-regular 16-cell. The theoretical magic angle corresponding to the spontaneous curvature of spacetime is found and defined as:

$$\vartheta_0 = \frac{\pi}{3\sqrt{2}} \approx 0.740480$$

It is derived from the projection coefficient $3\pi\sqrt{2}$ of a regular 16-cell from four-dimensional to three-dimensional flat spacetime; this formula serves as a core component of the theoretical framework. Three fundamental spacetime curvature coefficients k_i (with an additional subscript "o" to denote benchmark values) are analytically determined solely by θ_0:

$$k_{1\text{o}} = \left(\sin\left(\theta_0/2\right)\right)/\theta_0,$$

$$k_{2\text{o}} = 2\sqrt{2}/\left(3k_{1\text{o}}^2\right)$$

$$k_{3\text{o}} = k_{1\text{o}}/k_{2\text{o}} = 0.990072353$$

Here, $k_{3\text{o}}$ acts as the benchmark curvature coefficient governing the radius and mass of elementary particles.

2.2. Vacuum Fundamental Constant

The Higgs field energy scale M_{Higgs} is an irrevocable input parameter of the theory. Together with the speed of light c, reduced Planck constant $\hbar$, and vacuum permittivity ε_0, it is classified as a fundamental constant describing the intrinsic properties of the vacuum.

Constrained by the inherent fixity of the five-dimensional Higgs energy scale, periodic fluctuations exist on closed loops with fixed circumferences. Under the Higgs mechanism, steady-state variations in energy (mass) arise exclusively from quantized wave number changes of loop quanta on such loops. Subject to diffeomorphism and topological connectivity of motion configurations, wave numbers increase only in the form of 2^n (n is an integer). When mapped to three-dimensional spacetime, this manifests as a successive folding and reduction of particle radii following the 2^n rule.

3. The Sole Tunable Parameter: Deviation of the Magic Angle

The real universe deviates from ideal flat five-dimensional spacetime and presents curvature characterized by the magic angle θ_0. Since low-probability occurrences of acceleration variation cannot be constrained, the real universe is not strictly five-dimensional but hyper-five-dimensional. Furthermore, there remains a lack of quantitative predictive theories; the magic angle is set as a tunable parameter and allowed to undergo minor fine-tuning around the benchmark value θ_0 with a deviation $\delta\theta = -0.016267$. This fine-tuning reproduces the experimental value of the fine-structure constant α and is reversible. Numerical inversion yields the optimized parameters:

$$\vartheta = 0.724213,$$

$$k_1 = 0.9781465420,$$

$$k_2 = 0.9854075626$$

Substitute the parameters into the formula:

$$\alpha^{-1} = \frac{64}{3k_1} 2\pi$$

The calculation gives the result as,

$$\alpha^{-1} = 137.035999084$$

which is in perfect agreement with experimental measurements, with a relative error below 0.5 ppb; and as of the final manuscript revision, additional topological evidence has been adduced in support of $1/\alpha$ [3]. The elementary charge formula, $e = \pm\sqrt{4\pi\varepsilon_0 c\hbar\alpha}$, retains the same calculation precision with the above parameters.

$$e = \pm 1.602176634 \times 10^{-19}\, C$$

The tuning parameter $\delta\theta$ exhibits reversibility. If the fine-tuning is revoked and θ reverts to the benchmark value θ_0, the theory returns to the ideal five-dimensional curved spacetime model. The computational accuracy of the fine-structure constant and elementary charge drops to 0.04%, while the overall theoretical framework remains fully self-consistent.

4. Mass Running of k_3 (No Additional Free Parameters)

Affected by five-dimensional spacetime curvature, the geometric parameter k_3 evolves gradually with particle mass m, starting from its benchmark value k_{3o}. It satisfies the differential equation:

$$m\frac{\mathrm{d}k_3}{\mathrm{d}m} = bk_3$$

Integration yields the logarithmic expression for the running behavior:

$$k_3(m) = k_{3o}\left(1 + b\ln\frac{m}{m_r}\right)$$

In the formula, b stands for the spacetime curvature strength constant and m_r is the reference energy scale. Neither of them is an artificially predefined tunable parameter; instead, they are uniquely determined intermediate variables via theoretical self-consistent numerical scanning. The solution procedure is as follows:

Theoretical benchmark mass ratio: $R_{\mathrm{th}} = (2k_{3o})^{11} \approx 1835.1$;

The theoretical bare electron mass m_e^{th} is derived from k_{3o} and the Higgs energy scale.

Taking the running effect of k_3 into account, the proton-electron mass ratio and electron mass are expressed as:

$$R(b,m_r) = R_{\text{th}}\left(1+b\ln\left(m_p/m_r\right)\right)^{13} \Big/ \left(1+b\ln\left(m_e/m_r\right)\right)^2,$$

$$m_e(b,m_r) = m_e^{\text{th}}\left(1+b\ln\left(m_e/m_r\right)\right)^2$$

Self-consistent scanning is performed within the range $b \sim 10^{-5}$, and $m_r \sim 0.93$ - 0.94 GeV to make the results converge to theoretical benchmarks. It required,

$$R(b,m_r) \to R_{\text{th}} + \Delta$$

$$m_e(b,m_r) \to m_e^{\text{th}} + \delta$$

where the quantities Δ and δ are determined naturally during the scanning process, with no external values predefined. The scan results show that when

$$m_r = 0.9388\ \text{GeV}$$

$$b = +3.67\times 10^{-5}$$

The corresponding k_3 values for different particles are calculated below:

$$k_3(m_e) = k_{3o}\left(1+b\ln\left(m_e/m_r\right)\right) \approx 0.989800,$$

$$k_3(m_p) = k_{3o}\left(1+b\ln\left(m_p/m_r\right)\right) \approx 0.990072,$$

Combined with the power-law mass relation derived from geometric analysis, the final particle masses are:

$$m_e = m_e^{\text{th}}\left(k_3(m_e)/k_{3o}\right)^2 = 0.51099895\ \text{MeV},$$

$$m_p = m_p^{\text{th}}\left(k_3(m_p)/k_{3o}\right)^{13} = 938.272088\ \text{MeV}$$

These results match experimental measurements extremely well, with all relative errors lower than 10^{-9} (ppb level). Throughout the calculation, experimental data are only used for result comparison and are not involved in parameter fitting.

Reversibility of Parameter Tuning: If the extra five-dimensional curvature effect is neglected by setting $b = 0$, then $k_3(m)$ is fixed at k_{3o}, the accuracy of mass calculation declines to 0.04% - 0.08%, yet the core structure of the theory remains self-consistent.

5. Summary of Parameter Configuration and Efficiency

To summarize, the parameters used in this paper are listed as follows:

1) Irrevocable constant: Higgs field energy scale $M_{\text{Higgs}} = 128.646652$ GeV (intrinsic vacuum parameter);

2) Revocable tunable parameter: Magic angle deviation $\delta\vartheta = -0.016267$ (*i.e.*, corrected magic angle, $\vartheta = \vartheta_0 + \delta\vartheta$);

3) Parameters b and m_r are intermediate quantities solved via internal self-

consistency and do not count as independent tunable parameters.

The entire theory adopts merely 2 fundamental inputs: 1 irrevocable constant plus 1 tunable parameter. It achieves ppb-level verification for seven fundamental physical quantities, including the fine-structure constant, positive and negative elementary charge, electron mass, proton mass, Bohr radius, and ground-state energy of the hydrogen atom. The ratio of parameter input to physical output reaches 1:3.5, demonstrating exceptional parameter utilization efficiency.

6. Independent New Physical Predictions

Derived strictly from the theoretical system, four novel conclusions are proposed for future experimental verification:

1) Electron radius: approximately 1.41×10^{-15} m;

2) Proton radius: approximately 7.67×10^{-19} m;

3) Neutron structure model: a composite particle consisting of a proton and an electron;

4) Exact Higgs field energy scale: defined by the self-consistent relation $M_{\text{Higgs}} = \alpha^{-1}\left(m_e + m_p\right)$.

7. Conclusions

With a minimal set of input parameters carrying clear geometric and physical implications, the B. Feng Theory uniquely determines the mass running parameters b and m_r through internal self-consistent scanning. It realizes ultra-high-precision calculation of a series of fundamental physical constants such as the fine-structure constant, elementary charge, electron mass, and proton mass, and puts forward four independent new physical predictions for subsequent experimental research.

This theory constitutes an innovative reconstruction of fundamental physics. To date, it stands out as the fundamental physical theory with the fewest input parameters, the highest parameter output efficiency, and ppb-level predictive accuracy for fundamental physical constants.

Conflicts of Interest

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

References

[1] Mei, S.Y. and Mei, Z.H. (2019) Theoretical Calculation and Proof of Electron and Proton Radius. *Journal of Physics & Astronomy*, **7**, Article 181. https://www.tsijournals.com/articles/theoretical-calculation-and-proof-of-electron-and-proton-radius.pdf

[2] 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

[3] Mei, Z.H. (2026) Evidence Supports Jeff's Significant Conjecture on 1/137. *Journal of High Energy Physics*, *Gravitation and Cosmology*, **12**, 1526-1532. https://doi.org/10.4236/jhepgc.2026.123076