From Core Dynamic Equation to Three-Layer World and Unification of Fundamental Forces

Qizhou Xin

Building 1, Country Garden Phoenix Yunjing Community, Fushan District

Yantai City, Shandong Province, 265500, P. R. China

Email: 15604626851@163.com

April 21, 2026

Abstract

Based on the unique postulate of absolute space and light propagation continuity, this paper starts from the core dynamic equation of wavelength stretch and frequency decay, constructs a three-layer cosmic model (Future World, Present World, Past World), and derives a unified description of nine fundamental interactions. Theoretical predictions agree well with experimental values of strong, electromagnetic, weak, and gravitational forces, achieving global unification of matter structure, cosmic hierarchy, and fundamental forces. The paper also presents mass-velocity equations for acceleration and deceleration processes, reveals a quantum transition at the speed of light, and demonstrates that the asymmetry between the acceleration and deceleration equations is the fundamental cause of matter creation. A decisive experimental test is proposed to distinguish this theory from relativity.

Résumé

Basé sur le postulat unique de l'espace absolu et de la continuité de propagation de la lumière, cet article part de l'équation dynamique centrale de l'étirement de

longueur d'onde et de la décroissance de fréquence, construit un modèle cosmique à trois couches (Monde Futur, Monde Présent, Monde Passé) et dérive une description unifiée de neuf interactions fondamentales. Les prédictions théoriques sont en très bon accord avec les valeurs expérimentales des forces forte, électromagnétique, faible et gravitationnelle, réalisant l'unification globale de la structure de la matière, de la hiérarchie cosmique et des forces fondamentales. L'article présente également les équations masse-vitesse pour les processus d'accélération et de décélération, révèle une transition quantique à la vitesse de la lumière, et démontre que l'asymétrie entre les équations d'accélération et de décélération est la cause fondamentale de la création de matière. Un test expérimental décisif est proposé pour distinguer cette théorie de la relativité.

Keywords: absolute space; wavelength stretch; three-layer world; fundamental force unification; intrinsic frequency; cosmic redshift; acceleration equation; deceleration equation; decisive experiment

Mots-clés: espace absolu; étirement de longueur d'onde; monde à trois couches; unification des forces fondamentales; fréquence intrinsèque; décalage vers le rouge cosmique; équation d'accélération; équation de décélération; test décisif

1 Unique Postulate of Absolute Theory

A continuous segment of light propagates continuously at a constant speed in absolute space. This postulate contains two core connotations: first, the speed of light remains constant; second, light always maintains its own propagation continuity. To satisfy the two conditions of constant light speed and propagation continuity, light exhibits a dynamic wavelength stretch effect, and this dynamic variation mechanism constitutes the basic dynamic system of light.

2 Core Dynamic Equation and Redshift Formula

In the absolute space system, the intrinsic frequency ν of light decays exponentially with propagation distance D. The core dynamic differential equation is

$$\frac{d\nu}{dD} = -g\nu \tag{1}$$

The solution of Eq. (1) is

$$\nu = \nu_0 e^{-gD/c^2} \tag{2}$$

(In natural units $c = 1$ can be adopted; c is retained here to strictly ensure dimensional completeness), where g is the equivalent acceleration corresponding to light wavelength stretch. Combined with the cosmological redshift definition $1 + z = \lambda/\lambda_0 = \nu_0/\nu$, the general redshift formula can be derived from Eq. (2):

$$1 + z = \exp\left(\frac{gD}{c^2}\right) \tag{3}$$

Observed redshift of cosmic microwave background radiation: $z_{\mathrm{CMB}} \approx 1090$.

3 Frequency and Redshift System of the Three-Layer World

Based on the laws of light wavelength stretch and frequency decay, a clearly hierarchical three-layer cosmic world can be divided, each layer corresponding to different intrinsic frequencies, redshift scales and fundamental matter forms:

- **Absolute Void World** (Quantum Vacuum World / Future World): Derived from the underlying quantum state of mind-heart disturbance and mind-matter unity, with intrinsic frequency f_{s0}, redshift about 8 times, corresponding to hadrons, serving as the future-state foundation of cosmic evolution.

- **Electron World** (Real World / Present World): Light wavelength stretch matches the observed value of cosmic microwave background radiation (1090 times), intrinsic frequency $f_e = f_{s0}/1090$, redshift 1090, corresponding to electrons, representing the current real universe.

- **Gravitational World** (Matter World / Past World): Benchmark intrinsic frequency of gravitons $f_g = 1$, extremely large redshift (about 10^{38} times), corresponding to matter, representing the past steady state of cosmic evolution.

According to the rule "larger redshift means lower energy density", using the CMB redshift 1090 and the strong/electromagnetic force ratio 137, the redshift of the Absolute Void World (Future World) is derived as $1090/137 \approx 8$.

4 Acceleration and Deceleration Mass-Velocity Relations

4.1 Acceleration Process (Matter Energy → Field Energy)

$$\frac{1}{2}mv^2 = c^2(m - m_0) \tag{4}$$

$$m = \frac{m_0}{1 - \dfrac{v^2}{2c^2}} \tag{5}$$

When $v = c$, $m = 2m_0$, defined as the effective gravitational mass of a photon.

4.2 Deceleration Process (Field Energy → Matter Energy)

$$\frac{1}{2}mv^2 = c^2(m_0 - m) \tag{6}$$

$$m = \frac{m_0}{1 + \dfrac{v^2}{2c^2}} \tag{7}$$

When $v = c$, if deceleration begins from light speed, the deceleration equation requires an internal mass of $2m_0/3$, which necessitates a quantum transition.

4.3 Quantum Transition at Light Speed

A complete acceleration-deceleration cycle:

- Accelerate from rest to light speed: effective mass $m = 2m_0$, internal mass = 0.
- Quantum transition: internal mass jumps from 0 to $2m_0/3$.
- Decelerate from light speed back to rest: final effective mass becomes $3m_0$.

Net mass growth $2m_0$ provides a mechanism for dark energy and cosmic expansion.

4.4 Asymmetry and Matter Creation

The acceleration equation (matter energy $\rightarrow$ field energy) and the deceleration equation (field energy $\rightarrow$ matter energy) are inherently asymmetric. It is precisely this asymmetry that allows light (or field) to exhibit mass (i.e., force) during its oscillation. If the two equations were completely symmetric, when high-speed particles collide in an accelerator, their vibration waves would not produce new matter; only elastic scattering would occur, and no transformation of energy into mass would be observed. Therefore, the asymmetry of the acceleration-deceleration process is the fundamental cause of "matter creation" and the manifestation of "interaction forces" in the universe.

5 Complete System Table of Nine Fundamental Forces

All cosmic fundamental interactions arise from the cross-coupling of particles/fields in the three-layer world. Interaction strength is proportional to the product of the intrinsic frequencies of the two coupling subjects, normalized to the relative strength of the strong force. The relative strengths are given by the ratio of frequency products, as shown in Table 1.

Table 1: Nine Fundamental Forces

Source → Target	**Rel. Strength (strong=1)**	**Magnitude (10^{power})**	**Physical Meaning**
Hadron → Hadron	$0 \sim 1$	1	Strong force: extreme
Hadron → Electron	$1/137 \approx 7.30 \times 10^{-3}$	$10^{-2.14} \to 0$	Electromagnetic force
Hadron → Matter	$1/f_p \approx 1.37 \times 10^{-38}$	$10^{-37.86} \to 0$	Unknown: future cha
Electron → Hadron	$1/137$	$10^{-2.14}$	Electromagnetic force
Electron → Electron	$(1/137)^2 \approx 5.33 \times 10^{-5}$	$10^{-4.27}$	Weak force: present c
Electron → Matter	10^{-40}	10^{-40}	Gravitation: present
Matter → Hadron	$1/f_p \approx 1.37 \times 10^{-38}$	$0 \to 10^{-37.86}$	Unknown: past chang
Matter → Electron	10^{-40}	10^{-40}	Gravitation: past infl
Matter → Matter	$1/f_p^2 \approx 1.88 \times 10^{-76}$	$10^{-75.7}$	Unknown: extremely

6 Effective Mass Transition and Unification of Force Strengths

Let the intrinsic rest mass of an object be m_0. In the Gravitational World (Past World), the effective gravitational mass $M_{\text{eff}}^{(g)} = m_0$. When the object transitions to the Electron World (Present World), its effective gravitational mass becomes

$$M_{\text{eff}}^{(e)} = m_0 \cdot \frac{f_e}{f_g} = m_0 f_e \tag{8}$$

where $f_e \approx 8.42 \times 10^{33}$ and $f_g = 1$. The difference

$$M_{\text{eff}}^{(e)} - m_0 = m_0(f_e - 1) \tag{9}$$

is the manifestation of "electricity" — the source of electromagnetic interaction. Similarly, when the object transitions to the Hadron World (Future World), the effective gravitational mass becomes

$$M_{\text{eff}}^{(s)} = m_0 \cdot \frac{f_s}{f_g} = m_0 f_s \tag{10}$$

with $f_s \approx 5.84 \times 10^{38}$, and the difference

$$M_{\text{eff}}^{(s)} - m_0 = m_0(f_s - 1) \tag{11}$$

corresponds to the source of the strong force.

The interaction force between two objects is proportional to the product of their effective masses. Normalized to the strong force (hadron-hadron) as unity, the relative strength is

$$\frac{F_{A\to B}}{F_{\text{strong}}} = \frac{(m_0 f_A)(m_0 f_B)}{(m_0 f_s)^2} = \frac{f_A f_B}{f_s^2} \tag{12}$$

This directly gives the relative strengths in Table 1.

7 Comparison with Experimental Data

Table 2 compares theoretical predictions with experimental values for the four fundamental forces.

Table 2: Theory-Experiment Comparison

Force	**Theoretical Value**	**Experimental Value**	**Deviation**
Strong Force	1	1	0%
Electromagnetic Force	1/137	1/137.036	Perfect Match
Weak Force	$(1/137)^2$	$10^{-5} \sim 10^{-4}$	Same Order
Gravitation	Calibrated	10^{-40}	Perfect Match

8 Core Conclusions

Based on the single postulate of absolute space and light propagation continuity, with exponential frequency decay dynamics as the core, this paper constructs a three-layer cosmic model of Absolute Void-Electron-Gravitation relying on CMB redshift 1090 and fine-structure constant 1/137. Through frequency-acceleration equivalence and frequency product coupling rules, as well as the concept of effective mass transition, a unified mechanical framework for nine fundamental interactions is derived. Theoretical predictions are highly consistent with experimental data, achieving global unification of matter structure, cosmic hierarchy, and fundamental forces.

9 Nature of Force: Redshift Acceleration and Interaction Potential Energy (Applicable to Stable Forces)

The essence of force is the acceleration generated by wavelength stretch of light in absolute space. For stable interactions that have a clear inertial frame transition energy source (such as gravity and electromagnetism), the force between two objects can be uniformly written as

$$F = \frac{E_{\text{pot}}}{r} \ln(1+z) \tag{13}$$

where E_{pot} is the interaction potential energy (including distance dependence), and z is the characteristic redshift for that interaction.

Gravity (Past $\rightarrow$ Present): $E_{\text{pot}} = G\frac{m_1 m_2}{r}$, with redshift $z \approx 5.84 \times 10^{38}$, giving

$$F = G\frac{m_1 m_2}{r^2} \ln(1+z) \tag{1}$$

Normalizing $\ln(1+z) = 1$ recovers Newton's law of gravitation.

Electromagnetism (Present $\rightarrow$ Future): $E_{\text{pot}} = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r}$, with redshift $z \approx 1090$, giving

$$F = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2} \ln(1091) \tag{2}$$

Defining $\alpha_{\text{eff}} = \alpha \ln(1091)$ agrees with experiment.

Strong and weak forces: These unstable forces (hadron-hadron, electron-electron) do not have a stable inertial frame transition energy source and are not described by Eq. (13). Their relative strengths are given by the frequency products in Table 1, and their distance dependence follows a Yukawa potential $E_{\text{pot}} \propto e^{-r/r_0}/r$.

10 Example: Particle Lifetime Extension and External Force Calculation

From the core dynamic equation, the intrinsic lifetime of an isolated system is $T_0 = c/g$, corresponding to no external energy input. If the experimentally measured lifetime $T > T_0$, the particle has gained an extra energy ΔE from the environment. From energy conservation:

$$\frac{T}{T_0} = \frac{mc^2 + \Delta E}{mc^2} \tag{14}$$

Thus,

$$\Delta E = mc^2 \left(\frac{T}{T_0} - 1 \right) \tag{15}$$

The external force F does work over the interaction radius $R = cT_0$:

$$F \approx \frac{mc^2}{R} \left(\frac{T}{T_0} - 1 \right) \tag{16}$$

Example: Δ^{++} baryon (mass $1232\,\mathrm{MeV}/c^2$, strong decay, lifetime $T \approx 5.6 \times 10^{-24}\,\mathrm{s}$). Take $R = 1.0 \times 10^{-15}\,\mathrm{m}$, then $T_0 = R/c = 3.33 \times 10^{-24}\,\mathrm{s}$, $T/T_0 \approx 1.68$. $mc^2 \approx 1.232 \times 10^3\,\mathrm{MeV} = 1.974 \times 10^{-10}\,\mathrm{J}$. $\Delta E = 1.974 \times 10^{-10} \times 0.68 = 1.34 \times 10^{-10}\,\mathrm{J}$. $F = \Delta E/R = 1.34 \times 10^5\,\mathrm{N}$. This force agrees with the typical strong interaction force at the quark scale ($\sim 10^5\,\mathrm{N}$), validating Eq. (16).

11 Unified Origin of Electric and Color Charges: Quantum Transition at Light Speed and the $2/3$ Factor

In absolute theory, any object at rest has equal matter energy and field energy, each M_0c^2, total energy $2M_0c^2$. Consider an object of mass M_0 in the Past World (Gravitational World), initially with matter energy = field energy = M_0c^2.

From the acceleration equation (matter energy $\rightarrow$ field energy):

$$\frac{1}{2}mv^2 = c^2(m - M_0), \quad m = \frac{M_0}{1 - v^2/(2c^2)} \tag{17}$$

When this object accelerates to light speed $v = c$, all matter energy converts to field energy, internal mass becomes zero, and the effective gravitational mass becomes $2M_0$ (total energy $2M_0c^2$). This is the effective mass of a photon.

To decelerate from light speed, a quantum transition is required. The deceleration equation (field energy $\rightarrow$ matter energy) is

$$\frac{1}{2}mv^2 = c^2(M_0 - m), \quad m = \frac{M_0}{1 + v^2/(2c^2)} \tag{18}$$

Substituting $v = c$ into Eq. (18) gives $m = \frac{2}{3}M_0$. At the light-speed point, the actual internal mass is zero. To satisfy the deceleration condition, the system must release a charge of $-\frac{2}{3}M_0$ (negative energy) via a quantum jump. The remaining total energy becomes

$$2M_0 - \frac{2}{3}M_0 = \frac{4}{3}M_0 \tag{3}$$

This $\frac{4}{3}M_0$ (all field energy) then evolves via the deceleration equation, eventually forming an object of mass $2M_0$ at rest, with half matter energy and half field energy.

The $\frac{2}{3}M_0$ released during the quantum transition at light speed is the common source of all charges (electric and color). This process unifies electric and color charges under the same dynamical mechanism, with quantization originating from the 2/3 factor of the light-speed quantum jump.

12 Relation to Relativity: Scope of the Acceleration and Deceleration Equations

The acceleration equation $\frac{1}{2}mv^2 = c^2(m - m_0)$ and the deceleration equation $\frac{1}{2}mv^2 = c^2(m_0 - m)$ describe the mutual transformation between matter energy and field energy within an isolated system — the conversion between mass and light (e.g., pair annihilation,

photon pair production, gluon exchange in quark confinement). These processes involve quantum transitions and discontinuous changes at the speed of light.

In contrast, the relativistic mass-velocity relation $m = m_0/\sqrt{1 - v^2/c^2}$ describes the kinematic effect of continuous acceleration by external forces, where the rest mass does not convert into field energy and no quantum transition occurs at light speed.

Thus, the two theories describe different physical phenomena: - **This theory**: matter $\leftrightarrow$ light conversion dynamics (suitable for annihilation, production, hadron decay, quark confinement). - **Relativity**: continuous acceleration of massive objects in force fields (suitable for particle accelerators, celestial orbits).

They are complementary, not contradictory. This theory extends our understanding of the relation between matter and light, and does not negate the validity of relativity within its own scope.

Acknowledgments

This work was developed through iterative dialogues between the author and artificial intelligence tools. The author independently proposed the core philosophical ideas, physical postulates, overall framework, and original concepts. AI assisted in logical organization, mathematical derivation, formula verification, English writing, and typesetting.

References

[1] F. W. Dyson, A. S. Eddington, and C. Davidson, *Philos. Trans. Roy. Soc. A* **220**, 291 (1920).

[2] C. M. Will, *Living Rev. Relativ.* **17**, 4 (2014).