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Research Article

Anthropic Principle's Predicting Symmetric Distribution Matter Strata, Their Physics Laws, and Verifications

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This paper shows anthropic principle's predicting symmetric distribution matter strata, their physics laws, and verifications, concretely deduces characteristic time, energy, and temperature expressions at different scales, discovers four interesting invariant quantities, shows homeomorphic theorem of space map, and naturally presents a supersymmetric scale energy. We further discover that any infinitesimal space has the same proportional structure space; namely, they have renormalization group invariance. Consequently, this paper shows that the region of any n^{th} level Plank-scope is from the n^{th} level Planck scale to the $(n+1)^{th}$ level Planck scale, where the different matters of the n^{th}level Planck scale build up the $(n + 1)^{th}$ level Planck scale matter. The branches of physics science for this region include the n^{th} level Planck scale matter dynamics and the n^{th} level Planck scale matter group dynamics. The n^{th} level Planck scale matter group dynamics describe how the n^{th} level Planck scale matter constructs the $(n + 1)^{th}$ level Planck scale matter and how the different matters of the n^{th} level Planck scale evolve in the group system. This paper discovers that the different matters below Planck scale can exist with our matter world at the same time and same place and may be some candidates for dark matter; furthermore, this paper shows a relative theorem of matter scale: for the world of any n^{th} level, the matters' sizes are relative, not absolute. Evidently, the discoveries of both the symmetrical distribution scales and the relations among the corresponding different physics laws from infinitesimal to infinitely large scales give a scientific solid development platform for formation of new scientific branches and deeper development of old scientific branches, because we can precisely construct many kinds of scientific theories relevant to all the corresponding matter strata. All the branch sciences of different matter strata up to now naturally need to be included in the framework of the new scientific system of physics.

1. Introduction

A theory of everything (ToE) or ultimate theory is an all-encompassing theoretical framework of physics explaining and connecting all the aspects of physics of the universe [1, 2]. It is one of the key open problems in physics to find a theory of everything.

String theory is one of candidates of the final theory of the universe, which assumes that, from the starting point of the universe to 10^{-43} seconds after the Big Bang of the universe, the four basic forces are unified as a basic force, and thinks that, at its most microscopic Planck length, every particle is made up from the corresponding combinations of preferred vibrating strings [3–6]. Furthermore, string theory shows that, via these specific oscillatory patterns of strings, every particle with unique charge and mass is created [7–10]. The Planck length is the characteristic scale of oscillating strings forming elementary particles [7–10].

There up to now exist many anthropic principles and the relative very good investigations [11–26]; we, for convenience, consider two current kinds of anthropic principles:

(i) Strong anthropic principle [27]: The universe must have the properties that allow life at some stage to evolve in it in its history.

(ii) Weak anthropic principle [27]:

The observed values of all quantities in the universe are not equivalently probable, but taking values constrained by the demands that there are sites where carbon-based life can develop and by the demands that the universe is old enough for it to have made so.

From the gravitation formula of Newton, or one low-energy weak-field limit of string theory, one has

$$[G] = \frac{[Force]\,[L]^2}{[M]^2}, \tag{1}$$

it follows that [28]

$$G = 6.673\,(10) \times 10^{-11}\,\frac{m^3}{kg \cdot s^2}. \tag{2}$$

In terms of relativity and corresponding physics experiments, one has [28]

$$c = 2.99792458 \times 10^8\,\frac{m}{s}, \quad i.e., \ [c] = \frac{[L]}{[T]}. \tag{3}$$

Using quantum mechanics and its physics experiments, we have Planck constant [28]

$$\hbar = 1.054571596\,(82) \times 10^{-34}\,\frac{kg \cdot m^2}{s}$$
$$i.e., [\hbar] = [energy]\,[T] = \frac{[M] \cdot [L]^2}{[T]}. \tag{4}$$

Some useful physics tools are variational principle, analytical mechanics [29] and quantum mechanics [30], four basic interaction theories, and string theory etc. [3–10]; using them, people can further do many meaningful studies; e.g., [31] shows the analysis of the very inner Milky Way's dark matter distribution and gamma-ray signals, and [32] gives "on the dark matter distribution in the Milky Way."

Symmetry in mathematics has a general definition that any object is invariant under various transformations, e.g., scaling, rotation, or reflection. Symmetry in physics is generalized to invariance under various transformations, e.g., any coordinate transformations [33]. Symmetry is now one of the most powerful tools for physics; even people say that physics is the studies very closely related to symmetry [34]; for example, Noether's theorem is closely related to continuous symmetry transformations, which gives both Euler-Lagrange equations and a conserved current or corresponding conserved quantities [35], and Wigner's classification shows that the physics law symmetries decide the particle properties seen in nature [36].

The other essential symmetries in physics have discrete symmetries of physics systems [37, 38], particles' inner symmetries [39–41], and supersymmetric theory of particle physics [42, 43].

In theoretical physics, the renormalization group (RG) investigates the changes of physical systems at different scales and shows conformal invariance or scale invariance [44]. Self-similarity symmetries appear the same of a system at all scales; scale transformations are a kind of conformal transformations [45].

In renormalization group theories [44, 45], the system at a scale comprises the self-similar copies of itself when seen at a shorter scale, with diverse parameters representing the components of the system. The fundamental variables, e.g., components, can be related to elementary particles, atoms, atomic spins, etc. [44, 45]. The variable couplings measure the strength of various forces; the components themselves can consist of the more self-same components when one gets to smaller distances [44–46].

In its 125^{th} anniversary, Science magazine in the USA issued the 125 scientific problems of the world's leading frontiers [47], for five of the issued questions (1. What is the universe made of? 5. Can the laws of physics be unified? 26. Is the universe unique? 36. Are there more basic particles that are smaller than the quarks? 125. Will the study on particle physics standard model stop on the quantum Yang-Mills theory?); this paper is trying to do some of the work that is beneficially solving these problems.

This paper wants to study symmetric distribution secret codes of different matter strata from infinitesimal scale to infinitely large scale, corresponding sciences, and whole frameworks of science in the universe so that we can make some progress on finding a ToE, and concretely will improve or partly solve some problems above.

This paper is arranged as follows: Section 2 is characteristic time, energy, and temperature expressions of depending on different scales and shows homeomorphic map between $[0, 1]$ space and $[0, L]$ space; Section 3 is symmetric distribution secret codes of different characteristic times, energies, and temperatures for different matter strata from Planck scale to the star Sun-scopic scale; Section 4 is symmetric distribution secret codes of different characteristic times, energies, and temperatures for different matter strata from the star Sun-system-scopic scale to smaller than infinitely big (i.e., not equate infinitely big) scale; Section 5 gives symmetric distribution secret codes of different characteristic times, energies, and temperatures for different matter strata from the negative 1^{st} level to negative infinite level; Section 6 studies on the region of the n^{th} ($-\infty < n < \infty$) level Plank-scope and relevant branches of science; Section 7 demonstrates matter properties and sizes' relativity; Section 8 shows anthropic principle's predicting symmetric distribution matter strata and verifications; Section 9 is summary, conclusion, and perspective.

2. Characteristic Time, Energy, and Temperature Expressions of Depending on Different Scales and Homeomorphic Map between [0,1] Space and [0,L] Space

We now find the general characteristic time and energy expressions of depending on different scales, respectively.

Arbitrary length divided by (3), we get the corresponding characteristic time depending different scales

$$t_a = \frac{l_a}{c} = \frac{l_a}{2.99792458 \times 10^{10} cm/s}$$

$$or,\ t_{a+1} = \frac{l_{a+1}}{l_a} t_a, \tag{5}$$

where l_a is an arbitrary scale.

Multiplying (3) with (4), in nature unit system, we gain [48]

$$c\hbar = 1 = 197.3269618 MeV \times fm \equiv C_1. \tag{6}$$

Taking dimensions of (6), we acquire

$$[c]\,[\hbar] = \frac{[L]}{[T]}\,[energy]\,[T] = [L]\,[energy]. \tag{7}$$

Because of $1\,fm = 10^{-13} cm$ and using (6) and (7), we deduce arbitrary energy expression depending on its corresponding scale

$$E_a = \frac{197.3269618 MeV \times fm}{l_a}, \tag{8}$$

or

$$E_{a+1} = \frac{l_a}{l_{a+1}} E_a, \quad i.e.,\ E_{a+1} l_{a+1} = l_a E_a = C_1 \tag{9}$$

Thus we deduce the first new invariant quantity C_1 of product of corresponding feature energy and feature length, which physically means that the feature energy is inversely proportional to feature length; C_1 is their proportional constant.

Further putting (5) into (9), we deduce

$$E_{a+1} t_{a+1} = t_a E_a = \frac{C_1}{c} = C_2. \tag{10}$$

Thus we achieve the second new invariant quantity C_2 of product of corresponding feature energy and feature time, which physically means that the feature energy is inversely proportional to feature time; C_2 is their proportional constant.

For an arbitrary energy, there is the corresponding temperature [48, 49]

$$T_a = \frac{E_a}{k} \tag{11}$$

or

$$\begin{aligned} T_{a+1} &= \frac{E_{a+1}}{E_a} T_a, \\ T_{a+1} &= \frac{l_a}{l_{a+1}} T_a \\ or,\ T_{a+1} l_{a+1} &= l_a T_a = \frac{C_1}{k} = C_3, \end{aligned} \tag{12}$$

where $k = 1.3806488(13) \times 10^{-23} JK^{-1}$ is Boltzmann constant and $1eV = 1.602176565(35) \times 10^{-19} J$ [48] and we have used (8). The last expression of (12) is the third new invariant quantity C_3 of product of corresponding feature temperature and feature length, which physically means that the feature temperature is inversely proportional to feature length; C_3 is their proportional constant.

Putting (5) into (12), we get

$$T_{a+1} t_{a+1} = t_a T_a = \frac{C_1}{ck} = C_4. \tag{13}$$

Thus we get the fourth new invariant quantity C_4 of product of corresponding feature temperature and feature time, which physically means that the feature temperature is inversely proportional to feature time; C_4 is their proportional constant.

Therefore, we can use (5), (8), and (11) to calculate all relevant characteristic time, energy, and temperature in the following sections.

On the other hand, in order to investigate the infinitely small and infinitely big spaces, we now prove an important theorem.

Homeomorphic Theorem of Space Map: $[0, 1]$ space is homeomorphic to $[0, L)$ $(L < \infty)$ space.

Proof. We make a map by a formula

$$y = \frac{x}{L}, \quad x \in [0, L] \tag{14}$$

Equation (14) gives a homeomorphic map between $[0, 1]$ space and $[0, L]$ space; when $L \longrightarrow \infty$, but not equating ∞, because any finitely big number divided by any infinitely big number approaches zero, (14) gives a homeomorphic map between $[0, 1]$ space and $[0, L)$ $(L < \infty)$ space.

$[0, 1]$ and $[0, L]$ are topologically equivalent in mathematics, but in current physics, the scaling symmetry may or may not be valid. Therefore, we need to explore new physics for extending it to a general situation. In fact, when there exist the other fundamental interactions except the four known fundamental interactions, people can explore the current invalid scale below the Planck scale; see Sections 5 and 7.

Investigating distribution codes of different stable scale regions (i.e., different matter strata) from Planck scale to the Sun scale, we can summarize and generalize them as a useful expression

$$l_n = 1.61620 \times 10^{-33} \times 10^{5n} cm, \quad n = (-\infty, \infty), \tag{15}$$

Equation (15) is useful in the following sections. In the following sections, we use (15) to do relevant calculations. □

3. Symmetric Distribution Secret Codes of Different Characteristic Times, Energies, and Temperatures for Different Matter Strata from Planck Scale to the Star Sun-Scopic Scale

Because there exist some small factor influences and some inevitable errors in the contemporary scientific measurements, there usually are a few perturbative effects as a few amendations to physical laws of the domination for actual general physics systems; therefore, one uses usually magnitude orders to study and factually to depict matters of different stable scales.

Table 1: Different characteristic times, energies, and temperatures for different matter strata from Planck scale to the star Sun-scopic scale, $l_u = 1.61620$, $t_u = 5.3910596$, $E_u = 1.22093$, and $T_u = 1.41683057$.

n^{th} Planck scale	$l_{nP}(cm)$	$t_{nP}(s)$	$E_{nP}(GeV)$	$T_{nP}(K)$
0^{th} string's unit	$l_u 10^{-33}$	$t_u 10^{-44}$	$E_u 10^{19}$	$T_u 10^{32}$
1^{st} GUT's scale	$l_u 10^{-28}$	$t_u 10^{-39}$	$E_u 10^{14}$	$T_u 10^{27}$
2^{nd} sub-quark	$l_u 10^{-23}$	$t_u 10^{-34}$	$E_u 10^{9}$	$T_u 10^{22}$
3^{th}quark-lepton	$l_u 10^{-18}$	$t_u 10^{-29}$	$E_u 10^{4}$	$T_u 10^{17}$
4^{th} nucleon	$l_u 10^{-13}$	$t_u 10^{-24}$	$E_u 10^{-1}$	$T_u 10^{12}$
5^{th} atom	$l_u 10^{-8}$	$t_u 10^{-19}$	$E_u 10^{-6}$	$T_u 10^{7}$
6^{th} cell	$l_u 10^{-3}$	$t_u 10^{-14}$	$E_u 10^{-11}$	$T_u 10^{2}$
7^{th}human	$l_u 10^{2}$	$t_u 10^{-9}$	$E_u 10^{-16}$	$T_u 10^{-3}$
8^{th} the Earth	$l_u 10^{7}$	$t_u 10^{-4}$	$E_u 10^{-21}$	$T_u 10^{-8}$
9^{th} the Sun	$l_u 10^{12}$	$t_u 10^{1}$	$E_u 10^{-26}$	$T_u 10^{-13}$

We now further investigate symmetric distribution secret codes of different characteristic times, energies, and temperatures for different matter strata from Planck scale to the star Sun-scopic scale.

The 0^{th} level matter stratum ($n = 0$): using (15), we get Planck-scopic scale $l_{0P} = 1.61620 \times 10^{-33} cm$; it is the well-known basic unit scale of string theory unifying the four basic interactions of strong, weak, electromagnetism, and gravity; now string theory is viewed as the powerful theory of everything in the universe; namely, string theory can describe all kinds of basic interactions in the universe; substituting (15) into (5), we get Planck time $t_{0P} = l_{0P}/c = \sqrt{G\hbar/c^5} = 5.3910596 \times 10^{-44} s$, which shows the interacting characteristic time of this matter stratum; substituting (15) into (8), we obtain Planck energy $E_{0P} = 1.22093 \times 10^{19} GeV$, which uncovers the interacting characteristic energy of this matter stratum; inserting E_{0P} into (11), we find Planck temperature $T_{0P} = 1.41683057 \times 10^{32} K$, which reflects the characteristic temperature of this matter stratum. All the matters being seen in the universe consist of different strings with the characteristic scale, time, energy, and temperature [48].

The values of l_{0P}, t_{0P}, E_{0P}, and T_{0P} in the 0^{th} level matter stratum are the same as all the well-known values of l_P, t_P, E_P, and T_P in string theory [28] and cosmology [28], which means that our starting points are correct, and then we can continue to our research.

Similar to investigations of the 0^{th} level matter stratum, we can achieve Table 1 of different characteristic times, energies, and temperatures for different matter strata from Planck scale to the star Sun-scopic scale as shown in Table 1.

Some more investigations of Table 1:

The 1^{st} level matter stratum: the 1^{st} level Planck-scopic scale $l_{1P} = l_u 10^{-28} cm$ is the well-known scale of the grand unification theory (GUT) unifying the three basic interactions of strong, weak, and electromagnetism, the 1^{st} level Planck energy $E_{1P} = E_u 10^{14} GeV$ is characteristic energy of grand unification theory of this matter stratum, and this paper naturally achieves a more exact value of the grand unification energy than $10^{15} GeV$ of now the grand unification theory [48, 50, 51].

The 2^{nd} level matter stratum: the 2^{nd} level Planck-scopic scale $l_{2P} = l_u 10^{-23} cm$ is the well-known scale of subquark scale, namely, the preon scale [52–56]. There are a lot of investigations and achievements about different preon models and theories; e.g., see [52–60], so we do not repeat them here.

In terms of the secret codes' symmetric distribution and particle physics theories [48], especially, all basic interactions, e.g., grand unification theory and electroweak unification theory, begin at every himself or mesoscopic scale energy [48]; therefore, we deduce that the mesoscopic energy $E_{2.5P} = E_u 10^{6.5} GeV$ (corresponding to the scale $l_{2.5P} = l_u 10^{-21.5} cm$) between E_{2P} and E_{3P} may be viewed as a supersymmetric scale energy, which will be tested in future particle physics experiments, because the energy distribution below $E_{3P} = E_u 10^4 GeV$ (corresponding to the scale $l_{3P} = l_u 10^{-18} cm$) of the current particle physics experiments also has not given any supersymmetric signal [48]. More discussions about the mesoscopic energy $E_{2.5P}$ will be given in the following works because of the limit of this paper's length.

The 3^{rd} level matter stratum: the 3^{rd} level Planck-scopic scale $l_{3P} = l_u 10^{-18} cm$ is the well-known scale of quark and lepton theory with the three basic interactions of strong, weak, and electromagnetic interactions [48]; the 3^{rd} level Planck energy $E_{3P} = E_u 10^4 GeV$ is the interacting characteristic energy of electroweak unification theory of this matter stratum, for other investigations about this matter stratum see [48]; we do not repeat them here.

The 4^{th} level matter stratum: the 4^{th} level Planck-scopic (nucleon) scale $l_{4P} = l_u 10^{-13} cm$ is the well-known scale of nuclear theory [48]; the 4^{th} level Planck energy $E_{4P} = E_u 10^2 MeV$ is the interacting characteristic energy of nuclear theory of this matter stratum. There are a lot of investigations and achievements, e.g., in [48, 49].

The 5^{th} level matter stratum: the 5^{th} level Planck-scopic (Angstrom) scale $l_{5P} = l_u 10^{-8} cm$ is the well-known scale of atoms [48, 61]; the 5^{th} level Planck energy $E_{5P} = E_u KeV$ uncovers the interacting characteristic energy of atomic physics of this matter stratum. There are a lot of investigations and achievements for this matter stratum in [61], which are consistent with physical experiments [61].

The 6^{th} level matter stratum: the 6^{th} level Planck-scopic scale $l_{6P} = l_u 10^{-3} cm$ is the well-known scale of agglomerate

Table 2: Different characteristic times, energies, and temperatures for different matter strata from the star sun-system-scopic scale to universe group scale.

n^{th} Planck scale	$l_{nP}(cm)$	$t_{nP}(s)$	$E_{nP}(eV)$	$T_{nP}(K)$
10^{th} Sun-system	l_u10^{17}	t_u10^{6}	E_u10^{-22}	T_u10^{-18}
11^{th} Galaxy scale	l_u10^{22}	t_u10^{11}	E_u10^{-27}	T_u10^{-23}
12^{th} Universe	l_u10^{27}	t_u10^{16}	E_u10^{-32}	T_u10^{-28}
13^{th}Universe group	l_u10^{32}	t_u10^{21}	E_u10^{-37}	T_u10^{-33}

(for organic matter, e.g., cell) interactions [62–64], the 6^{th} level Planck energy $E_{6P} = E_u10^{-2}eV$ uncovers the interacting characteristic energy of agglomerates of this matter stratum, and the 6^{th} level Planck temperature $T_{6P} = T_u10^{2}K$ reflects the characteristic temperature of this matter stratum in vacuum. Because the interactions keeping this matter stratum are not basic interactions, namely, are residual (i.e., Van der Waals force) interactions of basic electromagnetic interactions, the binding energy keeping this matter stratum begins to show some divorce from basic electromagnetic interaction energy. Thus E_{6P} and T_{6P} begin to show some divorce from basic electromagnetic interaction energy. For other discussions, see [62–64].

For cells of mankind belonging to organic bodies in this matter stratum, there are the other mechanisms getting thermal quantity so that our cell feature temperature is 310.15K (=37+273.15K), e.g., biological ATP mechanism [65] and environment's heating.

The 7^{th} level matter stratum: the 7^{th} level Planck-scopic scale $l_{7P} = l_u10^{2}cm$ is the well-known average scale of human being; the 7^{th} level Planck temperature $T_{7P} = T_u10^{-3}K$ reflects the characteristic temperature of this matter stratum. There are a lot of investigations and achievements, e.g., in [49, 66].

For mankind belonging to organic bodies (similar to cells) in this matter stratum, there are the other mechanisms getting thermal quantity so that our body temperature is 310.15K, e.g., the biological ATP mechanism [67, 68], environment's heating, and Sun radiation.

In fact, there are a lot of possible values of mankind scale, but the universe really shows the exact average value of mankind scale, which means that there really are some profound physics; we thus call this scale mankind-scopic scale.

The 8^{th} level matter stratum: the 8^{th} level Planck-scopic scale $l_{8P} = l_u10^{7}cm$ (having a deviation of 1 order, which just gives the reason predicting the moon's form [69, 70]) is the well-known scale of the earth; the 8^{th} level Planck temperature $T_{8P} = T_u10^{-8}K$. There are a lot of investigations and achievements for this matter stratum, e.g., in [48, 71–73].

For the earth in this matter stratum, there are the other mechanisms getting thermal quantity so that average surface temperature of the earth is 14+273.15=287.15K, e.g., the environment's heating and Sun radiation. 1/2200000000 of the Sun radiation energy is radiated onto the earth; all these become the main source of light and heat of the earth.

The 9^{th} level matter stratum: the 9^{th} level Planck (or called the Sun)-scopic scale $l_{9P} = l_u10^{12}cm$ is just the well-known scale of the Sun [71–73]; the 9^{th} level Planck temperature $T_{9P} = T_u10^{-13}K$ reflects the characteristic temperature of this matter stratum. There are a lot of investigations and achievements of this matter stratum, e.g., in [71–73].

For the Sun in this matter stratum, there are the other mechanisms getting thermal quantity so that average surface temperature of the Sun is 5770+273.15=6043.15K, e.g., heating radiation from nuclear fusion of the Sun whose core temperature is 15000000+273.15=15000273.15K [71–73].

4. Symmetric Distribution Secret Codes of Different Characteristic Times, Energies, and Temperatures for Different Matter Strata from the Star Sun-System-Scopic Scale to Infinitely Big (but Not Equating Infinitely Big) Scale

Analogous to investigations of the 0^{th} level matter stratum, we can deduce Table 2 of different characteristic times, energies, and temperatures for different matter strata from the star Sun-system-scopic scale to Universe group scale as shown in Table 2.

Some further investigations of Table 2:

The 10^{th} level matter stratum: the 10^{th} level Planck-scopic scale $l_{10P} = l_u10^{17}cm$ is just the well-known star Sun-system-scopic scale [71–73], in which the Sun brings all matters to move round the center of Milky Way galaxy. There are a lot of investigations and achievements, e.g., in [71–73].

The 11^{th} level matter stratum: the 11^{th} level Planck-scopic scale $l_{11P} = l_u10^{22}cm$ is the well-known scale of Galaxy-scopic scale [71–73]. There are a lot of investigations and achievements, e.g., in [48, 71–73].

The 11.5^{th} level matter stratum ($n = 11.5$): the 11.5^{th} level Planck-scopic scale $l_{11.5P} = l_u10^{24.5}cm$ (or mesoscopic scale $l_{11.5P}$ between 11^{th} level Planck scale $l_{11P} = l_u10^{22}cm$ and 12^{th} level Planck scale $l_{12P} = l_u10^{27}cm$) is the well-known galaxy-groups-scopic scale [71–73]; substituting (15) into (5), we get the 11.5^{th} level Planck time $t_{11.5P} = t_u10^{13.5}s$, the 11.5^{th} level Planck energy $E_{11.5P} = E_u10^{-29.5}eV$, and the 11.5^{th} level Planck temperature $T_{11.5P} = T_u10^{-25.5}K$, which reflects the characteristic temperature of this matter stratum. There are a lot of investigations and achievements in [71–73].

The 12^{th} level matter stratum: the 12^{th} level Planck-scopic scale $l_{12P} = l_u10^{27}cm$ is the well-known scale of the Observable-Universe-scopic scale (but the scale of the Observable Universe is obtained from astronomy observation

$10^{28}cm$ [71–73], so $l_{12P} = l_u 10^{27} cm$ is not strict, which will be overcome in Section 6).

From the Sun-system-scopic scale to the Observable-Universe-scopic scale, there are the other mechanisms getting thermal quantity so that their average surface temperature is 2.7K, e.g., microwave background radiation; all these in these matter strata satisfy the actual astronomy observation [48, 71–73].

Among all the above investigations about scales, only the last two items and the 8^{th}-scale have differences with observations in $10^{0.5}$ and 10^1 times in scale. These differences are really tiny for the large astronomy units. The 8^{th}-scale problem has been solved, which just gives the reason predicting the moon's form [69, 70], and we will solve the two items' problems in the discussion in the next section.

The 13^{th} level matter stratum: the 13^{th} level Planck-scopic scale $l_{13P} = l_u 10^{32} cm$ is the Universe-group-scopic scale.

For the Observable-Universe-group-scopic scale, there are the other mechanisms getting thermal quantity so that average surface temperature of Universe-group-scopic scale is $T_{13P}K$, e.g., similar to the corresponding microwave background radiation [48, 71–73].

For the n^{th} level matter stratum ($13 < n$ = any positive integer $< \infty$, which means that our researched universes are finite), following the above research, we can do the similar generalizations; because it is very similar and easy, we do not do it again.

In the next section, we study the smaller matter strata than those of Planck scale, which are relevant to characteristic scale, time, energy, and temperature.

5. Symmetric Distribution Secret Codes of Different Characteristic Times, Energies, and Temperatures for Different Matter Strata from the Negative 1^{st} Level to Negative Infinite Level but Not Equating Negative Infinite Level

Up to now, all publically admitted physics laws have difficulties in keeping their effectiveness below Planck-scopic scale [3–6]. Therefore, for now, people usually do not discuss the Planck-scopic scale below. Using all the investigations above, we can naturally generalize all the investigations above to whole complete space.

In the current theories based on the four fundamental interactions, higher energy collisions corresponding shorter length than Planck length would create larger black holes; thus people cannot divide matter into smaller parts by collisions relevant to the four fundamental interactions [74]; the Planck length is the magnitude order oscillating strings of composing elementary particles, and smaller lengths have no physical sense in string theory and M-theory [3–6, 75]. Loop quantum gravity is one possible solution to the problem of quantum gravity, as is string theory [3–6]. In loop quantum gravity, the evolution of a spin network has a scale on the order of a Planck length, a minimum possible area is relevant to square of a Planck length, and smaller scales do not exist [3–6]. Therefore, when we want to break the limits of the current theories based on the four fundamental interactions so that we can study new fundamental interactions and reach shorter length than Planck length, we cannot use differently colliding methods based on the four interactions to dissolve the smaller matter than Planck length; thus we need to explore new theories, new methods, and new technologies; e.g., see the other parts of Section 5, Section 7, and the discussions below.

Using Homeomorphic Theorem of Space Map proved in Section 2, we can do investigations on the different matter strata in the universe from negative 1^{st} level to negative infinite level, because any infinitesimal space has the similar structure space with the similarly proportional spaces, and the proportion is not small, which does not depend on the fact that the spaces are infinitesimal or infinitely big. Consequently, we can have the following.

The -1^{st} level matter stratum ($n = -1$): using (15), we get the -1^{st} level Planck-scopic scale $l_{-1P} = 1.61620 \times 10^{-38} cm$; it is the scale of the -1^{st} level Planck-scopic theory unifying not only the four basic strong, weak, electromagnetic, and gravity interactions but also the -1^{st}level Planck-scopic new unknown basic theory, namely, which is analogous to string theory unifying the grand unification theory and basic gravity theory. The -1^{st} level Planck-scopic theory unifies string theory (belonging to 0^{th} level Planck-scopic level) and the -1^{st} level Planck-scopic new unknown basic theory that may be nonsimilar or similar to gravity; substituting (15) into (5), we get the -1^{st} level Planck time $t_{-1P} = 5.3910596 \times 10^{-49} s$, which shows the interacting characteristic time of the -1^{st} level Planck-scopic theory of this matter stratum; putting (15) into (8), we obtain the negative 1^{st} level Planck energy $E_{-1P} = 1.22093 \times 10^{24} GeV$, which uncovers the interacting characteristic energy of the -1^{st} level Planck-scopic theory of this matter stratum; inserting E_{-1P} into (11), we find the -1^{st} level Planck temperature $T_{-1P} = 1.41683057 \times 10^{37} K$, which reflects the characteristic temperature of this matter stratum.

The -2^{nd} level matter stratum ($n = -2$): using (15), we get the -2^{nd} level Planck-scopic scale $l_{-2P} = 1.61620 \times 10^{-43} cm$; it is the scale of the -2^{nd} level Planck-scopic theory unifying both the -1^{st} level Planck-scopic theory and the -2^{nd} level Planck-scopic new unknown basic theory; substituting (15) into (5), we get the -2^{nd} level Planck time $t_{-2P} = 5.3910596 \times 10^{-54} s$, which shows the interacting characteristic time of the -2^{nd} level Planck-scopic theory of this matter stratum; putting (15) into (8), we obtain the negative 2^{nd} level Planck energy $E_{-2P} = 1.22093 \times 10^{29} GeV$, which uncovers the interacting characteristic energy of the -2^{nd} level Planck-scopic theory of this matter stratum; inserting E_{-2P} into (11), we find the -2^{nd} level Planck temperature $T_{-2P} = 1.41683057 \times 10^{42} K$, which reflects the characteristic temperature of this matter stratum.

The $-m^{th}$ level matter stratum ($n = -m$, $2 < m < \infty$): using (15), we get the $-m^{th}$ level Planck-scopic scale $l_{-mP} = 1.61620 \times 10^{-33-5m} cm$; it is the scale of the $-m^{th}$ level Planck-scopic theory unifying both the $-(m-1)^{th}$ level

Planck-scopic theory and the $-m^{th}$ level Planck-scopic new unknown basic theory; substituting (15) into (5), we get the $-m^{th}$ level Planck time $t_{-mP} = 5.3910596 \times 10^{-44-5m} s$, which shows the interacting characteristic time of the $-m^{th}$ level Planck-scopic theory of this matter stratum; putting (15) into (8), we obtain the $-m^{th}$ level Planck energy $E_{-mP} = 1.22093 \times 10^{19+5m} GeV$, which uncovers the interacting characteristic energy of the $-m^{nd}$ level Planck-scopic theory of this matter stratum; inserting E_{-mP} into (11), we find the $-m^{th}$ level Planck temperature $T_{-mP} = 1.41683057 \times 10^{32+5m} K$, which reflects the characteristic temperature of this matter stratum.

For the $-m^{th}$ ($0 < m < \infty$, which means that our researched universes are even very small but not equating zero) level Planck-scopic new unknown basic theory, we may generally assume that every new unknown basic theory is a unification theory of some new unknown theories corresponding matter stratum, which then includes many kinds of different situations and is general research.

6. The Region of the n^{th} ($-\infty<n<\infty$) Level Plank-Scope and Relevant Branches of Science

The region of the 0^{th} level Plank (or call basic string)-scope is from the 0^{th} level Planck (or basic string) scale 10^{-33}cm to the 1^{st} level Planck (or phenomenological subpreon, i.e., sub-subquark) scale 10^{-28}cm. The branches of science for this region are relevant to quantum gravity, superstring theory, and the very early universe in cosmology. Particularly, quantum gravity, superstring theory, and the very early cosmology can together describe how the universe is created and how the universe evolves.

The region of the 1^{st} level Plank (or call subpreon)-scope is from the 1^{st} level Planck (or subpreon) scale 10^{-28}cm to the 2^{nd} level Planck (or call preon) scale 10^{-23}cm. The branches of science for this region are relevant to quantum gravity, superstring theory, the grand unification theory, subpreon theory, super-technicolor dynamics, and the early universe in cosmology. Particularly, quantum gravity and the early universe in cosmology can together describe how the universe evolves. Furthermore, super-technicolor dynamics describe how subpreons construct preon and how subpreons evolve.

The region of the 2^{nd} level Plank (or call preon, i.e., subquark)-scope is from the 2^{nd} level Planck (or preon) scale 10^{-23}cm to the 3^{rd} level Planck (or quark) scale 10^{-18}cm. The branches of science for this region are relevant to quantum gravity, superstring theory, preon theory, quantum supercolor (or call technicolor) dynamics, quark theory, and quantum chromodynamics. Particularly, technicolor dynamics describe how preons construct quarks and leptons and how preons evolve. There are a lot of investigations about quarks and leptons being constructed by preons [52–60].

The region of the 3^{rd} level Planck (or call quark and lepton)-scope is from the 3^{rd}level Planck (or quark) scale 10^{-18}cm to the 4^{th} level Planck (nuclear) scale 10^{-13}cm; i.e., it is the region from quarks and leptons to nucleus, hadrons such as protons and neutrons, etc. In this region there are now lots of reliable physics experimental results. The branches of science for this region include phenomenological string theory, quark theory, electroweak unification theory, quantum chromodynamics (QCD), quantum electrodynamics (QED), hadron physics, and nuclear physics, or, in summary, high energy particle physics theory. What is most important for phenomenology of this region is quantum chromodynamics (QCD) and its nonperturbative effects, etc. Particularly, quantum chromodynamics describe how quarks construct hadrons and how quarks evolve.

The region of the 4^{th} level Planck (or call nuclear)-scope is from the 4^{th} level Planck (or nuclear) scale 10^{-13}cm to the 5^{th} level Planck (or call atomic) scale 10^{-8}cm; i.e., it is the region from hadrons such as protons and neutrons to different atomics. In this region there are now lots of reliable physics experimental results. The branches of science for this region include quark theory, electroweak unification theory, quantum chromodynamics (QCD), quantum electrodynamics (QED), hadron physics, nuclear physics, and quantum mechanics. Particularly, quantum electrodynamics describe how protons and neutrons with electrons construct atomics and how protons and neutrons with electrons evolve.

The region of the 5^{th} level Plank (or atomic)-scope is from the 5^{th} level Planck (or atomic) scale 10^{-8}cm to the 6^{th} level Planck (or agglomerate or, for organic matter, cell) scale 10^{-3}cm, i.e., the region from atoms to microscopic agglomerates or call cluster. In this region there are now lots of reliable physics experimental results. The branches of science for this region include atomic physics, quantum electrodynamics, quantum mechanics, condensed matter physics, classical statistical physics, biological physics, and solid physics. For the organic matters, 10^{-3}cm is the scale of the cells which is the basic unit of human bodies. Thus, it is also the region studied by organic chemistry and inorganic chemistry. Particularly, agglomerate dynamics describe how atoms and molecules construct agglomerates and how atoms and molecules evolve in agglomerates.

The region of the 6^{th} level Plank (or call agglomerate)-scope is from the 6^{th} level Planck (or agglomerate) scale 10^{-3}cm to the 7^{th} level Planck (or mankind) scale 10^{2}cm, i.e., the region from clusters to mankind. In this region, there are now lots of reliable physics experimental results. The branches of science for this region include quantum mechanics, condensed matter physics, classical statistical physics, biological physics, and Newton mechanics. For the organic matters, 10^{2}cm is the scale of the human bodies. Thus, it is also the region studied by organic chemistry and inorganic chemistry. Since 10^{2}cm is already the scale of human beings, etc., e.g., this region is also studied by biology and sociality. Particularly, biological dynamics describe how agglomerates construct mankind and how agglomerates evolve in human bodies.

The region of the 7^{th} level Plank (or mankind)-scope is from the 7^{th} level Planck (or call mankind) scale 10^{2}cm to the 8^{th} level Planck (or earth) scale 10^{7}cm, i.e., the region

from mankind to the earth. In this region, there are now lots of reliable physics experimental results. The branches of science for this region include condensed matter physics, classical statistical physics, Newton mechanics, special relativity, general relativity, biological mechanics, and social science. For the organic matters, 10^2cm is the scale of the human bodies. Thus, it is also the region studied by organic chemistry and inorganic chemistry. Since 10^2cm is already the scale of human beings, etc., it is the first region of scales that human beings observe the macroscopic world and is also the region where human activities take place. Thus, the relevant branches of science for this region also include geology, biology, sociality, and ecology. Particularly, social dynamics describe how human constructs mankind society and how people evolve in human society.

The region of the 8^{th} level Plank (or call earth)-scope is from the 8^{th} level Planck (or earth) scale 10^7cm to the 9^{th} level Planck (or the Sun) scale 10^{12}cm, i.e., the region from the earth to the Sun. In this region, there are now lots of reliable physics experimental results. The branches of science for this region include condensed matter physics, classical statistical physics, Newton mechanics, planet mechanics, fluid mechanics, plasma physics, special relativity, and general relativity. Since 10^7cm is already the scale of the earth, etc., it is the first region of scales that the planets observe the Sun. It is the region considered by Newton mechanics, star dynamics, astronomy and general relativity, etc. Particularly, the Sun dynamics describe how the matters in the star construct the Sun and how the matters in the star evolve in the Sun.

The region of the 9^{th} level Plank (or call Sun)-scope is from the 9^{th}level Planck (or Sun) scale 10^{12}cm to the 10^{th} level Planck (or the Sun system) scale 10^{17}cm, i.e., the region from the Sun to the Sun system. In this region there are now lots of reliable physics experimental results. The branches of science for this region include condensed matter physics, classical statistical physics, Newton mechanics, planet mechanics, fluid mechanics, plasma physics, special relativity, general relativity, star physics, and star-system dynamics. Since 10^{12}cm is already the scale of the Sun etc, it is the first region of scales that the Sun observes the Sun system and is also the region where the Sun activities take place. It is the region considered by Newton mechanics, star physics, star-system dynamics, astronomy, general relativity, and so on. It is the region considered by Newton mechanics, star system dynamics, astronomy and general relativity, etc. Particularly, the Sun system dynamics describes how the Sun and the planets construct the Sun system and how the Sun and the planets evolve in the Sun system.

The region of the 10^{th} level Plank (or Sun-star-system or star-system)-scope is from the 10^{th}level Planck (or call Sun-star-system) scale 10^{17}cm to the 11^{th} level Planck (or the galaxy system) scale 10^{22}cm, i.e., the region from the Sun system to the Milk Way system, where star systems like the solar system build up galaxies such as the Milky Way. In this region, there are now lots of reliable physics experimental results. The branches of science for this region include condensed matter physics, classical statistical physics, Newton mechanics, planet dynamics, fluid mechanics, plasma physics, special relativity, general relativity, star physics, star-system dynamics, black hole physics, and galactic system dynamics. Since 10^{17}cm is already the scale of the Sun system, etc., it is the first region of scales that the Sun system observes galaxy system and is also the region where the Sun system activities take place. It is the region considered by Newton mechanics, star physics, star-system dynamics, galaxy dynamics, astronomy, general relativity, cosmology, and so on. Particularly, galaxy dynamics describe how the star systems with planets and black holes with star systems construct galaxies and how galaxies develop, and especially the dark matter dynamics.

The region of the 11^{th} level Plank (or call galaxy-system)-scope is from the 11^{th}level Planck (or galaxy-system) scale 10^{22}cm to the 11.5^{th} level Planck (or the galaxy system group) scale $10^{24.5}$ cm, i.e., the region from the galaxy system to the galaxy system group, where star systems like the galaxy system build up galaxy system group such as local cluster of galaxies. In this region, there are now lots of reliable physics experimental results. The branches of science for this region include Newton mechanics, special relativity, general relativity, galactic system dynamics, and galactic system group dynamics. Since 10^{22}cm is already the scale of the galaxy system, etc., it is the first region of scales that the galaxy system observes galaxy system group and is also the region where the galaxy system activities take place. It is the region considered by Newton mechanics, galaxy system dynamics, galaxy system group dynamics, astronomy, general relativity, cosmology, and so on. Particularly, galaxy system group dynamics describe how galaxy systems construct galaxy system group and how galaxy system group develops, and especially the dark matter dynamics, or galaxy group theory and its evolutionary dynamics.

The region of the 11.5^{th} level Plank (or call galaxy-system group)-scope is from the 11.5^{th} level Planck (or galaxy-system) scale 10^{22}cm to the 12^{th} level Planck (or the observable universe) scale 10^{27} cm, i.e., the region from the galaxy system group to the observable universe, where the galaxy system groups build up the whole observable universe. In this region, there are now lots of physics experimental results. The branches of science for this region include Newton mechanics, special relativity, general relativity, galactic system dynamics, galactic system group dynamics, and the universe dynamics. Since $10^{24.5}$cm is already the scale of the galaxy system group, etc., it is the first region of scales that the galaxy system group observes the whole observable universe and is also the region where the galaxy system group activities take place. It is the region considered by Newton mechanics, galaxy system dynamics, galaxy system group dynamics, astronomy, general relativity, the universe dynamics, cosmology, and so on. Particularly, the universe dynamics describe how galaxy systems groups construct the observable universe and how galaxy system group develops, and especially the dark matter dynamics, or galaxy system group theory and its evolutionary dynamics.

The region of the 12^{th} level Plank (or call the universe)-scope is from the 12^{th}level Planck (or the universe) scale 10^{27}cm to the 13^{th} level Planck (or the universe group)

scale 10^{32}cm, i.e., the region from the observable universe to the universe group, where the different universes build up the whole universe group. The branches of science for this region include special relativity, general relativity, the universe dynamics, and the universe group dynamics. Since 10^{27} cm is already the scale of the observable universe, etc., it is the first region of scales that the observable universe observes the whole universe group and is also the region where the different universe activities take place. It is the region considered by general relativity, the universe dynamics, cosmology, the universe group dynamics, and so on. Particularly, the universe group dynamics describe how the different universes construct the universe group and how different universes develop, and especially the dark matter dynamics, or the universe group theory and its evolutionary dynamics.

Under the influence of the contemporary post-acceleration in the expansion of the universe, the expanding distances between galaxies are increasing more rapidly than the stationary value, which leads to the fact that the scale of the observable universe is one order of magnitude larger than the theoretical scale obtained from comparison with all the matters which are stationary due to their inner attraction's balancing against the cosmological expansion. Meanwhile, since there are powerful gravitation sources, the star and black hole, respectively, in the celestial bodies in the scale-scopic regions of the Star-system-scope and the Galaxy-scope, their actual scale only additionally increases a bit due to post-acceleration of cosmological expansion. Besides, for the matters in the scale-scopic regions of star and planet or even smaller scales, the influence of the cosmological expansion is small enough to be neglected in scale consideration. So, theoretically, after the post-acceleration effects are considered, the scale of the observable universe is about 10^{28}cm [71–73], which is totally consistent with astronomy observation.

For general case of n>12, we can have that the region of the n^{th} level Plank-scope is from the n^{th}level Planck scale to the $(n+1)^{th}$ level Planck scale, i.e., the region from the n^{th}level Planck scale matter to the $(n+1)^{th}$ level Planck scale matter, where the different matters of the n^{th}level Planck scale build up the $(n+1)^{th}$ level Planck scale matter. The branches of science for this region include the n^{th}level Planck scale matter dynamics and the $(n+1)^{th}$ level Planck scale matter dynamics. It is the first region of scales that the different matters of the n^{th}level Planck scale observe the whole $(n+1)^{th}$ level Planck scale matter, and is also the region where activities of different matters of the n^{th}level Planck scale take place. It is the region considered by the n^{th}level Planck scale matter dynamics, the $(n+1)^{th}$ level Planck scale matter, and so on. Particularly, the $(n+1)^{th}$ level Planck scale matter dynamics describe how the n^{th}level Planck scale matter constructs the $(n+1)^{th}$ level Planck scale matter and how the different matters of the n^{th}level Planck scale evolve, and especially the dark matter dynamics, or the $(n+1)^{th}$ level Planck scale matter (i.e., the n^{th} level Planck scale matter group) theory and its evolutionary dynamics.

It is well-known that, under Planck scale, all known physics laws lose their effects [3–6], but there are different kinds of matters and relevant dynamics from the known current matters and dynamics, and it also should be effective that low stratum matters are constructed by lower stratum matters according to the most general rule in the universe, and the relevant dynamics show how low stratum matters are constructed by lower stratum matters. Therefore, we can continue to do our following research.

The region of the -1^{th} level Plank-scope 10^{-38}cm is from the -1^{th}level Planck scale 10^{-38}cm to the 0^{th} level Planck scale 10^{-33}cm, i.e., the region from the -1^{th}level Planck scale matter to the 0^{th} level Planck scale matter, where the different matters of the -1^{th}level Planck scale build up the 0^{th} level Planck scale matter. The branches of science for this region include the -1^{th} level Planck scale matter dynamics and the 0^{th} level Planck scale matter dynamics. It is the first region of scales that the different matters of the -1^{th} level Planck scale observe the whole 0^{th} level Planck scale matter, and is also the region where the different matters of the -1^{th} level Planck scale take place. It is the region considered by the -1^{th} level Planck scale matter dynamics, the 0^{th} level Planck scale matter, and so on. Particularly, the 0^{th} level Planck scale matter dynamics describe how the -1^{th} level Planck scale matter constructs the 0^{th} level Planck scale matter and how the -1^{th} level Planck scale different matter evolves, and especially the dark matter dynamics, or the 0^{th} level Planck scale matter theory and its evolutionary dynamics.

For the case of general m>1, the region of the $-m^{th}$ level Plank-scope 10^{-33-5m} is from the $-m^{th}$level Planck scale 10^{-33-5m} to the $-(m-1)^{th}$ level Planck scale $10^{-33-5(m-1)}$, i.e., the region from the $-m^{th}$level Planck scale matter to the $-(m-1)^{th}$ level Planck scale matter, where the different matters of the $-m^{th}$ level Planck scale build up the $-(m-1)^{th}$ level Planck scale matter. The branches of science for this region include the $-m^{th}$level Planck scale matter dynamics and the $-(m-1)^{th}$ level Planck scale matter dynamics. It is the first region of scales that the different matters of the $-m^{th}$level Planck scale observe the whole–$(m-1)^{th}$ level Planck scale matter group, and is also the region where the different matters of the $-m^{th}$level Planck scale take place. It is the region considered by the $-m^{th}$level Planck scale matter dynamics, the $-(m-1)^{th}$ level Planck scale matter, and so on. Particularly, the $-(m-1)^{th}$ level Planck scale matter dynamics describe how the $-m^{th}$level Planck scale matter constructs the $-(m-1)^{th}$ level Planck scale matter and how the different matter of the $-m^{th}$level Planck scale evolves, and especially the dark matter dynamics, or the $-(m-1)^{th}$ level Planck scale matter (the $-m^{th}$ level Planck scale matter group) theory and its evolutionary dynamics.

Therefore, we generally and concretely study the region of the n^{th} $(-\infty < n < \infty)$ level Plank-scope and relevant branches of science. They have renormalization group structure symmetry, i.e., self-similar property [44, 45].

7. Matter Properties and Sizes' Relativity

Up to now, it is well-known that, below Planck scale, all known physics laws cannot keep effective [3–6]; we thus have to find new laws. In terms of the investigations above, there should be new different kinds of matters and new physics laws in the new matter strata below Planck scale. What are they ?

According to the basic laws of physics, in which large-scale substances can be synthesized by small-scale matter, then, the smaller the matter is, the more fundamental it is. The more microscopic matter may be uncharged, without color charges, i.e., electrically neutral, color neutral; the micro matters can also carry some other new kinds of charge and color charge, and the charge and color charge of these new species cannot also be measured by our current experimental apparatus, because these new charges can also have no interaction with the electric charge and the color charge we know, just as our strong interaction charge does not interact with the electric charge [7–10, 48, 50, 51]. And because we already know that all the new kinds of charge and color charge are without interaction with the all charges we know, so we cannot see, especially, they are 10^5 orders of magnitude smaller than our known microscopic matter, e.g., leptons, so they can freely pass through our bodies and all kinds of material we have seen. The microscopic material can be virtual material; the virtual material may be superluminal (such as Tachyon in field theory) [3–6]. More microscopic substances that satisfy new physical laws can also be no subject to now known physical laws. The substances we know cannot hold back the penetration of these new substances. Just like a beam of neutrinos is not charged, it can pass through our earth and our bodies as well as our any obstacles; this is because the earth and our bodies, etc., the distributions of these matters, in fact, are very sparse relatively.

We also see that the more microscopic the matter is, the larger the binding energy of the matter is; the more microscopic the matter forming the lives is, the stronger their abilities to maintain stability are, which may explain why the higher level lives in other spaces (if there exist the higher level lives) are more capable of sustaining stability. This is because the energy binding the microscopic matters to form macroscopic matters is higher than that of binding the macroscopic matters to form more macroscopic matters. In this way, the system can be stable; otherwise, when the system meets some energy interference, it will globally collapse instantly. For example, the energy binging quarks to form the nucleon is compared with the energy binding nucleons to form atomic nucleus; the energy binging quarks to form the nucleon is higher, so the properties of these matters are relative.

On the other hand, to be specific, we consider the orbital radius of hydrogen atom [30]

$$\langle r\rangle_{nlm} = \langle r\rangle_{100} = \frac{3}{2}a_0, \tag{16}$$

where $a_0 = \hbar^2/me^2$ is the Bohr orbital radius, the orbital radius of the hydrogen atom is inversely proportional to the charges' product of the nucleus and electrons, i.e., the larger the charge, the smaller the radius, and the smaller the charge, the greater the radius; the orbital radius of the hydrogen atom is also inversely proportional to the mass of the electron, i.e., the larger the mass, the smaller the radius. On the other hand, it can also exist that the associated charges (no interaction with the known electric charge and color charge) vary with some parameters, such as, in the renormalization theory, mass and charges can change with the energy [48]. Therefore, the scale of this matter can also vary with these parameters; thus, this matter (with the energy increasing or decreasing) can belong to be small or large (or see (9)) respectively, and can be dense and sparse as well as penetrating. Consequently, there can be the other spaces at the same time and the same place; that is, different matters make up the corresponding spaces.

For a moving particle with mass in central force field

$$V = -\frac{\beta}{r^\alpha}, \quad \beta > 0, \tag{17}$$

using Virial theorem, we have the mean value relationship between kinetic energy and potential energy in any bound state

$$\begin{aligned}\langle T\rangle &= -\frac{1}{2}\overline{\mathbf{F}\cdot\mathbf{r}} = \frac{1}{2}\langle \mathbf{r}\cdot\nabla V\rangle = -\frac{1}{2}\left\langle r\frac{d}{dr}\frac{\beta}{r^\alpha}\right\rangle \\ &= -\frac{\alpha}{2}\langle V\rangle\end{aligned} \tag{18}$$

Thus we have total energy

$$\begin{aligned}E &= \langle T+V\rangle = \left(1-\frac{2}{\alpha}\right)\langle T\rangle = \left(1-\frac{\alpha}{2}\right)\langle V\rangle \\ &= \left(\frac{\alpha}{2}-1\right)\beta\left\langle\frac{1}{r^\alpha}\right\rangle,\end{aligned} \tag{19}$$

When $0 < \alpha < 2$, (19) takes negative value; then the system has the different bounded states; i.e., this system may form stable matter state.

From the quantitative causal principle, we deduce all the basic interaction laws of physics and give their applications [76–82]; then we can use the principle to give further descriptions of the physics laws of all different matters, because all the matters' motion laws must satisfy causal principle; otherwise, the laws are unable to be accepted, which will be given in following works due to limit of length of this paper. Particularly, (19) satisfies the quantitative causal principle because (18) is just showing the causal transformation relation between kinetic energy and potential energy.

Under the Planck scale space for the similar matter if we assume that the substance has relevant expressions (16), then see if the system carries the other new kinds of charges and masses, which are that our current experiments cannot measure, or are not interacting with, what we know now. The smaller the charges and the new masses are, then the larger the radius of the compounded matters from the matters below its Planck scale is, and the sparser the composite matters are. Consequently, these composite matters can pass through our bodies and our any obstacle, so it is difficult to detect them.

Similarly, different atoms and molecules can be formed; furthermore, different matter condensates and corresponding distribution of matters can be made up. Then according to general relativity [83, 84], they also can form different matters, different distributions of the matters result in the corresponding bending different spacetimes, and thus there are the new theories of general relativity and so on depending on the distributions of the matters. However, the parameters of the new general relativity should be changed to the relevant parameters of the new matter hierarchy. If and only if the matters, charges, and the related qualities of determining new general relativity are without the interaction with our now known matters, the charges, and the related qualities, then this new general relativity and our now known general relativity can be independent of each other and have no relation.

There are at least three situations: (1) because the masses of the new species can be regarded as new kinds of new mass charges [3–10], the new masses do not interact or are repulsive interactions with the now known mass, which will cause new physical phenomena; (2) particularly, the matters compounded from the masses below the Planck scale can be extended to our macroscopic scale according to (16); that is, they can go out Planck scale; namely, there is the case that the masses from the Planck scale can influence our world of matter, but because they have the masses and the charges different from ours, and are with or without the interaction with ours, they are very sparse. Thus, it is very difficult for us to detect them; (3) in case (2), if and only if, this new mass charge can be repulsive to the now known mass, which will lead to new physical repulsion. Particularly, for example, the extreme condition of the infinite radius can be dark energy; that is, dark energy can be such a substance. Therefore, this paper gives a new mechanism for the generation of dark energy substances.

Because these matters are at least 10^5 orders of magnitude smaller than ours, there are different kinds of charges, etc. We cannot detect them now. Therefore, in terms of the research in this paper, they can exist with our matter world at the same time and the same place and will not be discovered by our present science and technology. Consequently, we want to develop our science and technology, and we have stages, goals, and directions for finding new physics.

This is because if all our physical constants of determining us big or small enlarge or shrink at the size of the same magnitude, we will not find our body size changes. Because modern physics has taught us that we cannot know the absolute value of ourselves and that we can know everything is relative to the scales determined by all physical parameters around us, the sizes are relative sizes [48]. Therefore, we obtain a new theorem: the Relative Theorem of the Sizes of Matters: for the world of any nth level, the scales resulting from all our physical constants that determine our sizes are magnified or reduced at the same magnitude, and then we will not find changes in our sizes. For the maximum limit situation of their symmetry, it is the symmetry of conformal transformation of matters at different levels of the system [45].

Therefore, for the world of any nth level, the matters' sizes of all beings are relative, not absolute.

8. Anthropic Principle's Predicting Symmetric Distribution Matter Strata and Verifications

In terms of the discovered symmetric scale distribution laws of different matter scales, the 0^{th} and 1^{th} level Planck scales are, respectively, the superstring theory's and the grand unification theory's scales for physical basic interactions of matter; from the 2^{th} to the 5^{th} level Planck scales are from very microscopic matter scales up to the well-known scale of atoms, which is the base constructing mankind's matter; the 6^{th} level Planck scale is the well-known scale of agglomerate (inorganic matter and especially for organic matter, e.g., cell) matter bases (consisted by lots of atoms) constructing mankind; the 7^{th} level Planck scale is just the well-known average scale of mankind; from the 8^{th} to the 10^{th} level Planck scales are from the earth up to sun and sun system scales, which are just the external environments mankind's living needs; from the 11^{th} to the 12^{th} level Planck scales are from Galaxy-scopic system scale up to Galaxy-scopic system group (11.5^{th} level Planck scale) and the observable universe scale. Namely, all these are shown and/or designed for or at least their relating existence of mankind.

Therefore, mankind's everything can be obtained, which are the matter consisting of mankind bodies and mankind's living matter circumstances; these are from the factors below. Using natural number $n = 0, 1, \ldots, 12$, we further utilize light velocity c, Planck constant $\hbar$, and gravitation constant G and then take the other parameters of physics, namely, nineteen basic parameters of standard theory of the basic interactions at least: (i) 3 gauge coupling parameters g_3, g_2, g_1 belonging to fundamental interaction standard model's three groups $SU(3) \times SU(2) \times U(1)$; (ii) 9 fermion masses; (iii) 4 parameters for CKM matrix (i.e., 3 mix angles $\theta_{12}, \theta_{23}, \theta_{13}$ and a phase angle δ); (iv) 2 Higgs potential parameter (or equivalent m_Z, m_H); (v) a strong CP violation parameter θ [7–10].

Thus, the natural numbers $n = 0, 1, \ldots, 12$ and the 19 parameters are dependent; we then can give their relationships between the natural numbers and the 19 parameters, which will be, in detail, given in our following paper because of length limit of this paper. Because Hawking proved that no needing God, after the relevant initial and boundary conditions are set and the physics laws generating universe are stipulated, our universe could be created automatically; e.g., see, [44]. Therefore, utilizing the relevant parameters and the relationships, people can also create the universe when the relevant initial and boundary conditions are set and the physics laws generating universe are stipulated.

In terms of anthropic principle, we need mankind and then need the matter bases consisting mankind and the living environments for mankind; we need, in wisdom, to take the above physics parameters and the natural numbers under the conditions that people can give boundary and initial conditions and stipulate the physical laws.

The period from the capitalism industrial revolution to now is about three hundred years; we have gotten the great achievements for all the current sciences, again after three hundred years, three thousand years, thirty thousand years,

and even more, we could arrive at the above conditions according to our scientific development velocity.

We have, especially now, achieved the partial feeling of being the great creater; i.e., we are able to clone various types of animals and even mankind's bodies, utilizing gene technology, we are able to improve features of all plants and animals, even comprising mankind's features; moreover, in future, replacing Darwin's evolutionism with feedback adjustable automation, we are able to create the biologic bodies from simple to complex or from simple cell to many cells automatically via our needing some adjustions, which make everything seen by us be Darwin's evolutionism results. Utilizing the higher large hadron colliders (LHC), etc., in the future, when the accelerator's energy could be high enough, we are able to even create the universe's early vacuum and even further create the early vacuum's phase transition for the universe, which could lead to the appearance of the early universe's big bang.

Consequently, people would be able to create the universe, due to existing needs; namely, after forty-five hundred million years, the sun would become a red giant star; after about thirty-four hundred million years, the great colliding between Andromeda galax and Milky Way galaxy would appear, and the universe is now expanding at acceleration [32, 45].

The big rip or big collapse, etc., of the universe would be the universe's final fate [45], which would not conform to mankind's living needs. Consequently, we, at least, have the motivation for studying and/or experimentally creating one new universe in order to satisfy mankind's surviving requirement. If there is one civilization advancing now the mankind about 138 hundred million years at least, whether they also would create the universe as people would do after thirty thousand years even more some years. These very interesting problems are worth to carefully study both now and in the future.

All these above show the novel verifications of anthropic principle's predicting symmetric distribution matter strata, which conform to all our current experiments' verifications; namely, **not only are all having observed matter strata predicted by anthropic principle, but also the anthoropic principle predicts new matter strata in this paper, which will be tested by the future experiments.**

9. Summary, Conclusion, and Perspective

In modern science, for the definition and division of different matter strata, there up to now still are very strong artificial factors and many different methods; they lead to the nonunification and chaos and truly hinder accurately systematical studies about different branches of science for the universe's all matters from both local and global perspective. We try to conquer some of these problems.

In this paper, we give symmetric distribution secret codes of different matter strata from infinitesimal scale to infinitely large scale, corresponding physics, and whole framework of physics science for the Universe, e.g., deducing characteristic time, energy, and temperature expressions at different scales, discovering four interesting invariant quantities uncovering the features of different stratum systems (i.e., deducing four new invariant quantities of the products between feature energy, length, temperature, and time, which physically means that one feature quantity is inversely proportional to the other feature quantity between the four feature quantities, and the four new invariant quantities also are just their proportional constants, respectively) and we show Homeomorphic Theorem of Space Map: $[0, 1]$ space is homeomorphic to $[0, L]$ ($L < \infty$) space, which is key for understanding the relations and similar properties with the same proportional coefficient between infinitesimal and infinitely big scales as well as between different matter strata.

We further concretely present their relevant branch sciences for different matter strata from infinitesimal scale to infinitely big scale.

Based on the above investigations, we generally show the characters of the region of any n^{th} ($-\infty < n < \infty$) level Planck-scope and relevant branches of science.

In order to research in a rigorous manner, the derivation of different scale-scopic regions of the Whole Universe Matters is based on strict objective reality and has eliminated the former artificial factors.

In terms of the symmetric distribution of the characteristic energy, the paper naturally achieves more exact value $1.22093 \times 10^{14} GeV$ of the grand unification energy than $10^{15} GeV$ of now the grand unification theory.

Because all basic interactions, e.g., grand unification theory and electroweak unification theory, begin at every himself scale energy, this paper shows that the energy $E_{2.5} = 1.22093 \times 10^{6.5} GeV$ corresponding the scale $a \times 10^{-21.5} cm$ may be a supersymmetric scale energy and which will be tested in future particle physics experiments.

Using Homeomorphic Theorem of Space Map, this paper investigates and shows physics laws of the different matter strata in the universe from negative 1^{st} level to negative infinite level, because any infinitesimal space has the similar structure space with the similarly proportional spaces, and the proportion not only is not small, but also is the same, which does not depend on the fact that the spaces are infinitesimal or infinitely big; namely, they have renormalization group invariance.

Consequently, this paper gets the -1^{st} level Planck-scopic scale $l_{-1P} = 1.61620 \times 10^{-38} cm$; it is the scale of the -1^{st} level Planck-scopic theory unifying not only the four basic strong, weak, electromagnetic, and gravity interactions but also the -1^{st} level Planck-scopic new unknown basic theory, which is analogous to string theory unifying the grand unification theory and basic gravity theory. The -1^{st} level Planck-scopic theory unifies string theory (belonging to 0^{th} level Planck-scopic level) and the -1^{st} level Planck-scopic new unknown basic theory.

Similarly and concretely, this paper gets the $-m^{th}$ level Planck-scopic scale $l_{-mP} = 1.61620 \times 10^{-33-5m} cm$; it is the scale of the $-m^{th}$ level Planck-scopic theory unifying both the $-(m-1)^{th}$ level Planck-scopic theory and the $-m^{th}$ level Planck-scopic new unknown basic theory, which shows the interacting characteristic time, energy, and temperature of the $-m^{th}$ level Planck-scopic theory of this matter stratum.

The region of the 0^{th} level Plank-scope is from the 0^{th} level Planck scale 10^{-33}cm to the 1^{st} level Planck scale 10^{-28}cm. The branches of science for this region are relevant to quantum gravity, superstring theory, and the very early cosmology. Particularly, quantum gravity, superstring theory, and the very early cosmology can together describe how the universe is created and how the universe evolves.

This paper shows that the region of the n^{th} (n>0) level Plank-scope is from the n^{th} level Planck scale to the $(n+1)^{th}$ level Planck scale, where the different matters of the n^{th} level Planck scale build up the $(n+1)^{th}$ level Planck scale matter. The branches of science for this region include the n^{th} level Planck scale matter dynamics and the $(n+1)^{th}$ level Planck scale matter dynamics. It is the region of the scale that the different matters of the n^{th} level Planck scale observes the whole the $(n+1)^{th}$ level Planck scale matter, and is also the region of activities of different matters of the n^{th} level Planck scale.

The region of the $-m^{th}$ (m>0) level Plank-scope 10^{-33-5m} is from the $-m^{th}$ level Planck scale 10^{-33-5m} to the $-(m-1)^{th}$ level Planck scale $10^{-33-5(m-1)}$, where the different matters of the $-m^{th}$ level Planck scale build up the $-(m\text{-}1)^{th}$ level Planck scale matter. The branches of science for this region include the $-m^{th}$ level Planck scale matter dynamics and the $-(m-1)^{th}$ level Planck scale matter dynamics. It is the first region of scales that the different matters of the $-m^{th}$ level Planck scale observe the whole$-(m-1)^{th}$ level Planck scale matter, and is also the region where the different matters of the $-m^{th}$ level Planck scale take place. The $-(m-1)^{th}$ level Planck scale matter dynamics describe how the $-m^{th}$ level Planck scale matter constructs the $-(m-1)^{th}$ level Planck scale matter (i.e., $-m^{th}$ level Planck scale matter group) and how the different matter of the $-m^{th}$ level Planck scale evolves.

This paper finds that because these microscopic matters are at least 10^5 orders of magnitude smaller than ours, e.g., leptons, there are different kinds of charges (no or very weak interaction with current known charges), etc. that we cannot detect now. Therefore, in terms of the research in this paper, they can exist with our matter world at the same time and the same place.

We obtain a new theorem, i.e., the relative theorem of the sizes of matters: for the world of any nth level, the scales resulting from all our physical constants that decide our sizes are magnified or reduced at the same magnitude, and we will not find changes in our sizes. For the maximum limit situation of their symmetry, it is the symmetry of conformal transformation of matters at different levels of the system.

Therefore, for the world of any nth level, the matters' sizes are relative, not absolute.

We have discovered, in this paper, a lot of these coincidences and then want to stress the following:

(1) Electrons, quarks, protons, neutrons, nuclei, and atoms all show at the following interval points of their scope-scale regions. Why so? Are these particles special? In fact, they are just the fundamental particles creating our bodies from small to big, which is also just the needs for getting mankind.

(2) The basic cell's scale of mankind bodies and the average height scale of mankind just locate at the following interval points of their scope-scale regions, which are just the needs for getting mankind. It is surprising really!

(3) It is surprising that the earth and the sun belonging to the living exterior environments for mankind both locate at the following interval points of the scales. Why? Are both Earth and the sun special? Why could they both be special? Which are just the needs for getting the living exterior environments for mankind.

(4) Why should all the already known scale matters (with $n = 0, 1, 2, \ldots, 12$) related to mankind locate at the following interval points of their scope-scale regions no any exception? All these are really interesting large accidents, which are related to natural numbers $n = 0, 1, 2, \ldots, 12$, namely, they are really wisdom choices. What should the large "accidents" mean? Or, should be, in the universe, mankind special? All these above can be seen as novel verifications of anthropic principle's predicting symmetric distribution matter strata, which fit all current experiments' verifications; i.e., not only are all observed matter strata predicted by anthropic principle, but also the anthoropic principle predicts new matter strata, which will be tested in future experiments. Particularly, the new predicted matters strata give new physics and new knowledge for the universe.

(5) All the discoveries of different scales provide both a strict scientific foundation for corresponding new or old branches of science and global and local considerations for the relations of different branches of science.

(6) Do all the consequences for different stratum matters, etc. belong to simply striking coincidence or other causes, perhaps a wise "design"? This is a really novel problem! There should exist some profound physics that should be studied deeper.

(7) These problems' solutions must be some very key progresses for science; anyway, this paper gives key studies and developments for future science.

(8) Different matters below Planck's scale may be some candidates for dark matter, thus giving us a number of other sources of dark matter.

(9) Evidently, the discoveries of both the symmetrical distribution scales and the relationships among the corresponding different physics laws from infinitesimal scale to infinitely large scale give out a scientific solid development platform for formations of new scientific branches and old scientific branches' deeper development, because we can precisely construct many kinds of scientific theories relevant to all material strata from infinitesimal scale to infinitely big scale. Namely, at least, people can certainly view the physics in every region as the physics of the corresponding scale. Consequently, the results of this paper are very useful and would be extensively applied and propagated and would promote scientific different branch developments, because the results conform to current experiments of physics and are with the very important actual meanings of physics, etc.; some of them would appear in relevant textbooks.

Following this paper, there exist a lot of studies that need to be done, which would be worked in following works for any researcher; for example, people would be able to present

the key relations among all the basic physics parameters, all the nature numbers (from infinitesimal to infinite), and so on, which would eliminate the extra relevant degrees of freedom, facilitate relevant theories, and achieve brand fresh physics and the corresponding theories with the mark "n^{th}" ($-\infty < n < \infty$).

So far all the branch sciences of different matter strata not only should but also naturally need to be included into the framework of this new scientific system of physics here, and this has a marker corresponding natural number n, which makes people able to see the position and status of any branch of different matter level sciences in the whole of science and their relationship between different disciplines, and then people can very well grasp the whole of all branch sciences of physics. All the consequences and achievements in this paper would motivate people to more deeply and systematically comprehend all these different current branch sciences and to promote the development of their sciences.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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