A physical axiom system based on the spirit

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Abstract This paper established a physical axiom system. By the axiom system we can derive important physical laws such as momentum conservation law, Newton's second law, Newton's law of gravity, Schrödinger equation and Maxwell's equations, simplified existing physical theories and explain some physical phenomenons those unresolved by traditional physical theories. We can also derive Schwarzschild solution of external spherically symmetric gravitational field, gravitational red shift equation, proved that if in large-scale distance, Newton's law of gravity and red shift equation must be corrected, the data by corrected formulas meet the astronomical observed results well.

Key Words Philosophy; Axiom system; Spirit; The laws of physics

1 Introduction

Physical world is set by spirit logically, it is the basic viewpoint of this paper, by this viewpoint we can get a complete and perfect theoretical system. Because spirit is not any mental activity, any idea of people is not spirit, even rigorous logical thinking of people is not spirit, so the questions those like " Can we change the world only by thinking ? " are completely meaningless, the world certainly can not being changed by any people's mental activities.

The theoretical system not only satisfied the results of experimental observations, but also being deduced some data or conclusions those can not obtained by traditional theories. For example the definition formula of electric field $\vec{E}$ and magnetic field $\vec{B}$, where $\triangleq$ denotes being defined as, e denotes electron charge, α denotes fine structure constant, c denotes light speed, i denotes imaginary unit, p and $\vec{p}$ are two physical quantities with momentum's dimension. The definitions of p and $\vec{p}$ will be given later.

$$\vec{E} \triangleq \frac{\alpha c}{e}(\nabla p + i \nabla \times \vec{p})$$

$$\vec{B} \triangleq \frac{\alpha}{e}(i \nabla p - \nabla \times \vec{p})$$

Because curl and divergence of $\vec{E}$ and $\vec{B}$ are exactly Maxwell's equations, so the definition of $\vec{E}$ and $\vec{B}$ can describe electricity and magnetism well. Another example, the theoretical value of Avogadro constant N_A , where α denotes fine structure constant, m_p denotes rest mass of a proton.

$$N_A = \frac{0.001(1+\alpha)\sqrt{1-\alpha^2}}{m_p} = 6.0221058107 \times 10^{23}\, mol^{-1}$$

Since the physical world is set by the spirit logically, the next step is to explain what is the spirit, what is the substance and some basic concepts related.

2 Basic Concept

2.1 Spirit and Substance

The concept of spirit has many meanings, in this paper, "A true dharma", "Alaya", "Manas" and "Consciousness" are collectively referred to as spirit. If we must give spirit a definition, it can be defined as the subject of philosophical sense which can set or identify the objects according to some logical rules. Although the definition does not accurately describe the meaning of the spirit, but it can be used to separate the concept of spirit from other areas in certain situations.

There are various mathematical space, such as Hilbert space, Banach space, Euclidean space, Riemann space and so on, although each of them have different mathematical meaning, but they are collectively referred to as space. Similarly, the concepts such as "A true dharma", "Alaya", "Manas" and "Consciousness" have their respective meanings, but they are collectively referred to as spirit. In order to facilitate the literal statement, we will always need some comprehensive and general concepts to summarize the words those have similar meanings, spirit is the concept like that.

Assuming exist the origin of everything, then it is a special kind of logical starting point. In this paper, the origin of everything in particular refers to "A true dharma", that means "A true dharma" is defined as the logical starting point of everything, it is the supreme absolute spirit. We can get some basic properties of "A true dharma" by the definition.

1. "A true dharma" is unique.

   Assuming exist two different "A true dharma", denoted by A and B . Because "A true dharma" is the logical starting point of everything, then $A \to B$ and $B \to A$, so we get $A \leftrightarrow B$. That means A and B are logical equivalence relationship, so "A true dharma" must be unique.

2. "A true dharma" must corresponds continuum.

   If "A true dharma" can not correspond continuum, then some numbers will be found outside the logical relationship of "A true dharma", contradiction with the proposition that "A true dharma" is the logical starting point of everything.

3. "A true dharma" must have infinite transfinite number $\aleph_\infty$ dimensions.

   If "A true dharma" has not $\aleph_\infty$ dimensions, then some dimensions will be found outside the logical relationship of "A true dharma", contradiction with the proposition that "A true dharma" is the logical starting point of everything.

Because "A true dharma" must has $\aleph_\infty$ dimensions, so the spirit may have dimension attribute. For all $m, n \in \mathbb{N}$ and $m < n$, promise that n-dimensional spirits can only set and identify n-dimensional spaces, and an n-dimensional spirit can be divided into m-dimensional sub-spirits.

"A true dharma" is an $\aleph_\infty$-dimensional spirit, denoted by $\bigcirc$. "Alaya" is an $\aleph_1$-dimensional sub-spirit of $\bigcirc$, denoted by ϑ . "Manas" is a 6-dimensional sub-spirit of ϑ , denoted by ξ . "Consciousness" is a 3-dimensional sub-spirit of ξ , denoted by ϕ .

In order to distinguish the different meanings of spirits, "Consciousness" can be denoted by ϕ_i , "Manas" can be denoted by ξ_i, "Alaya" can be denoted by ϑ_i , where i denotes a serial number. In this paper, the subscripts exist the priorities, the first subscript must correspond to the observer's view. For example, X_{ij} must include the meaning that in the view of observer i.

According to the Buddhist point of view, ϕ has abilities to observe and identify, ξ has abilities to measure and compare, ϑ has abilities to map everything, this paper adopted the views.

Similar to spirit, substance is also a comprehensive and general concept, but it being circular defined in philosophy, so substance is an undefined concept indeed, substance has not a clear definition in physics too.

Because we can not determine the connotation and extension of any concept without a clear definition, so any undefined concept will impossible satisfy the law of identity. Since any theory which related substance can not satisfy the basic principles of logic, then it will not establish any theoretical system of self consistent by substance logically.

But if we abandon the concept that substance is primary, we can indeed give substance a strict definition. Action quantum (the value is equal to Planck's constant) can be defined as the basic material unit. Regardless an object is a elementary particle or a galaxy, as long as it can be described by action, it must be substance.

For example, we say a photon is substance, not because of its objectivity or reality, but because it can be described by action, we say Wednesday is not substance, not because Wednesday does not have objectivity or reality, but because Wednesday can not being described by action. In this paper, because action can be strictly defined by ϕ , so we can give substance a strict definition by spirit.

2.2 Interval Number and Physical Quantity

In mathematics, 0 can be defined by empty set $\varnothing$, $0 = \varnothing$, 1 can be defined by 0 , $1 = \{0\}$, but $\{0\}$ can not represent an interval indeed , 1 or $\{0\}$ as the standard interval is undefined.

It something like marking scales on a real axis. After determined the coordinate origin 0 , to determine a standard interval 1 will be a kind of subjective behavior. Because in a real axis does not exist a natural, objective standard interval 1 , so the standard interval 1 can only being set subjectively, even the subjective setting only has conceptual or logical framework. That means exist essentially difference between natural number 1 and interval 1 .

Define interval number as the number which can be used to represent an interval in mathematics. Since the standard interval 1 can only being set subjectively, then any interval numbers are being set subjectively in nature. Because natural numbers can be defined as $0 = \varnothing$, $1 = \{0\}$, $2 = \{0, 1\}$, $3 = \{0, 1, 2\}$, $\cdots\cdots$, so any natural number is not a interval number.

Suppose a spirit did a subjective setting, then the interval number 1 has been determined, under this condition, multiplied the interval number 1 with all natural numbers, we get a new interval number series, define the set of new interval number series as natural interval number set, denoted by $\mathbb{Z}^+$. Let all the elements in $\mathbb{Z}^+$ turn to their opposite number, we get a new interval number series, define the set of new opposite interval number series as opposite natural interval number set, denoted by $\mathbb{Z}^-$.

The set of integers can be defined as $\mathbb{Z} \leftrightarrow \mathbb{Z}^+ \cup \mathbb{Z}^-$. Obviously, all integers are interval numbers. In this sense, the natural numbers set $\mathbb{N}$ is not the subset of integer set $\mathbb{Z}$.

We may believe it does not exist any natural number in a real axis, all the natural numbers exist in sets, being used to do the counting operation. When we count by natural numbers along a real axis, any counting number does not exist in the real axis, it exists outside the real axis. All the points on the real axis are the coordinate points, any coordinate point can not be used to count but be used to determine the interval between the coordinate and the origin.

2.3 Time and Causality

Time is defined as observers' subjective feeling about changes. Imagine a world without any change, even people's minds have not any change, we can completely regard the world as a time stopping world, once appears any perceptible change, then time of the world runs. This is the nature of time.

Causality is an important concept. For any two different moments t_1 and t_2 , during the time interval (t_1, t_2) , if the relations between object set A at t_1 and object set B at t_2 can form a separate event D according to some logical rules C , then on the issues of D , $A \wedge C$ will be the reason of $B \wedge D$, $B \wedge D$ will be the result of $A \wedge C$, that means $A \wedge C$ and $B \wedge D$ will form a logical implication relationship $A \wedge C \to B \wedge D$.

For example, if an object X is in the inertial motion, the logical rule C which X followed is Newton's first law, object set A is X at t_1 moment, object set B is X at t_2 moment, it will form a separate event during the time interval (t_1, t_2) , the separate event D can be named motion event of X , then $A \wedge C$ will be the reason of $B \wedge D$.

Causality is for the contents of different moments. Because any content at the same time will be either the reason or the result, so any content which related a complete causality must correspond to a time interval. Causality is for the division of events, different dividing result corresponding to different causal relationship. For example, a person shots hitting the target, for shooting target event, shot is reason, a bullet hit the target is result, but for the bullet consuming event, shot is reason, consumed a bullet is result.

Any mathematical proof or logical reasoning process does not constitute causality, because their contents are not for different moments. Although mathematical proof or logical reasoning process often use words like because or then, but those are only mathematical or logical relationship but not causal relationship. For example, the hypothetical syllogism $(A \to B) \wedge (B \to C) \Rightarrow (A \to C)$ does not contain any causal relationship. We can not think that $(A \to B) \wedge (B \to C)$ is the reason of $A \to C$ or $A \to C$ is the result of $(A \to B) \wedge (B \to C)$.

"All the apples are fruit" can be expressed as $A \to B$, where A denotes apple, B denotes fruit. "All the fruits are non-toxic" can be expressed as $B \to C$, where C denotes non-toxic. By $(A \to B) \wedge (B \to C)$ we can get the conclusion $A \to C$, that means all the apples are non-toxic, but it is clear that the real reason of "all the apples are non-toxic" is not by the combination of "all the fruits are non-toxic" and "all the apples are fruit", a lot of fruits in nature are toxic, but apples are non-toxic, that means the logic reasoning itself does not form real causalities.

3 Postulate

3.1 Quantum and Light Speed

Postulate 1. *The finite dimensional spirit can only process the finite data.*

By Postulate 1 , a finite dimensional spirit must have a limit of its data processing ability, the lower limit corresponds to the physical quantum. One note need to be explained, some kind of quantum like mass quantum dose not correspond the real limit of finite data processing ability, so it can only be named deduced quantum or pseudo quantum.

qt_i denotes time quantum, qs_i denotes space quantum or length quantum, the definition of qt_i is the minimum time interval which can be identified by ϕ_i, the definition of qs_i is the minimum space

interval which can be identified by ϕ_i . Because time is the subjective feeling of changes, so for any qt_i , there must have some changes being identified by ϕ_i .

Because the process of ϕ_i set or identify a three-dimensional space can be regarded as a series of independent events corresponding to a series of qt_i , and the causal relationship of any independent event will eventually relate a space interval, so the changes those ϕ_i felt in each qt_i will eventually relate a space interval, this is equivalent ϕ_i contains a basic element which has velocity dimension, the basic element act on a time point will be the instantaneous speed, act on a time interval will be the length. The basic element is defined as the absolute light speed of ϕ_i , denoted by c .

Define $c \triangleq qs_i/qt_i$. Because for any ϕ_i , both space quantum qs_i and time quantum qt_i are all constants, so c must be a constant. In traditional theories, c represents the light speed in vacuum, but in this paper, c represents the absolute light speed of ϕ_i .

In the premise of not misleading, space quantum can be denoted by qs , qs is equal to Planck length, time quantum can be denoted by qt , qt is equal to Planck time, then $c = qs/qt$. The definition formula $c \triangleq qs_i/qt_i$ only express mathematical relations, but not means qs_i/qt_i is the reason of c .

We can regard any operation of spirit as a kind of data processing. Because continuous means can be infinitely subdivided, so according to Postulate 1 , whatever time or space, any finite dimensional spirit can only process discrete points, but can not identify any continuous time or space interval. That means any object which can be distinguished by a finite dimensional spirit must be composed by discrete points, and can only occur isolated time points. Because these discrete points are determined by absolute light speed c and time quantum qt_i of ϕ_i , so the discrete points will be the logical recognition points of ϕ_i .

It does not contain infinite amount of data in the integer 1 which a finite dimensional spirit set out, although any non 0 interval of mathematics includes infinite number of points, but for a finite dimensional spirit, those points can be meaningless. it just like the international standard meter contains infinite points, but only contains the limited number of Planck lengths.

3.2 Feature Vector and Mirror Image

Assuming that "A true dharma" $\bigcirc$ is perfectly $\aleph_\infty$-dimensional hyper spherical symmetric, then "Alaya" ϑ will be $\aleph_1$-dimensional hyper spherical symmetric, "Manas" ξ will be 6-dimensional hyper spherical symmetric, "Consciousness" ϕ will be 3-dimensional spherical symmetric. By postulate 1 , ϕ_i will not identify itself, so we can reasonable assume that ϕ_i will identify itself as a feature vector, the start point of the vector is the center of ϕ_i, the norm of the vector is a special length, the end point of the vector is a feature point.

$\vec{\xi_i}$ denotes the feature vector of ξ_i , to describe $\vec{\xi_i}$ requires a linear space, assuming the linear space is a six-dimensional Euclidean space, denoted by $E\xi_i$, $E\xi_i$ is defined as the background space of ξ_i .

$\vec{\phi_i}$ denotes the feature vector of ϕ_i , to describe $\vec{\phi_i}$ requires a linear space, assuming the linear space is a three-dimensional Euclidean space, denoted by $E\phi_i$, $E\phi_i$ is defined as the background space of ϕ_i .

The definition of standard image is the congruent mapping image of the image source.

${\xi_i}^j$ denotes the outer image of ξ_i to ξ_j , it's the standard image ξ_i mapped to $E\xi_j$.

${E\xi_i}^j$ denotes the outer image space of ξ_i to ξ_j , it's the standard image $E\xi_i$ mapped to $E\xi_j$.

ϕ_{ij} denotes the inner image of ϕ_i , it's the orthogonal projection ${\xi_i}^j$ mapped to $E\phi_i$.

$E\phi_{ij}$ denotes the inner image space of ϕ_i , it's the orthogonal projection ${E\xi_i}^j$ mapped to $E\phi_i$.

Define self mapping as the mapping operation which can form the inner or outer image.

$\forall x \forall n$, $n \in \mathbb{N}$, define the n-th image of x as the image which formed by n times continuous self mappings of x.

Postulate 2. *The n-th image of ϕ reflects the status of ϕ at nqt before.*

ϕ_{ij} does not reflect original dimensions of ϕ_i necessarily. Assuming the six dimension numbers of ξ_i can form set $A = \{0, 1, 2, 3, 4, 5\}$, the corresponding three dimension numbers of ϕ_i can form set $B = \{0, 1, 2\}$, C denotes projection dimension numbers set of ϕ_{ij} , because ϕ_{ij} is a inner image of ξ_i in $E\phi_i$, so the elements of C may be any three elements of A.

$Card(X)$ denotes the total elements number of set X .

If $Card(B \cap C) = 0$, define ϕ_{ij} as 0-dimensional inner image of ϕ_i , denoted by ${\phi_{ij}}^0$, represents a photon.

If $Card(B \cap C) = 1$, define ϕ_{ij} as 1-dimensional inner image of ϕ_i , denoted by ${\phi_{ij}}^1$, represents an elf quantum.

If $Card(B \cap C) = 2$, define ϕ_{ij} as 2-dimensional inner image of ϕ_i , denoted by ${\phi_{ij}}^2$, represents a vacuum quantum.

If $Card(B \cap C) = 3$, define ϕ_{ij} as 3-dimensional inner image of ϕ_i , denoted by ${\phi_{ij}}^3$, represents a hydrogen atom.

In this paper, the hydrogen atom is generalized, it can represent both a real hydrogen atom and a basic logic element of other atoms. For example, we can directly regard ^{4}He as 4 hydrogen atoms, directly regard ^{12}C as 12 hydrogen atoms. An elf quantum is probably a neutrino, but due to the lack of sufficient data to prove, so this paper only presents the idea, but not go in-depth analysis.

3.3 Rotational and Reciprocal Transformation

Assuming the three dimensions of $E\phi_i$ are determined by three mutually orthogonal degrees of freedom rotation those being set by ϕ_i , then ϕ_i and ϕ_{ij} will show mutually orthogonal three degrees of freedom intrinsic rotations. If we regard ϕ_i as static, then $E\phi_i$ will be rotated, if we regard $E\phi_i$ as static, then ϕ_i will be rotated.

We regard $E\phi_i$ as static first. Because each rotation degree of freedom corresponds to an angular frequency, in some special position of ϕ_i rotation radius, the linear velocity belong to the specific degree of freedom will be exactly equal to absolute light speed c , so the logical recognition points of ϕ_i will be focused on the special positions those being swept by special radius. Assuming the three angular frequencies of ϕ_i corresponds to three different constants, then the rotating ϕ_i will form the three layers spatial structure which being determined by absolute light speed c .

Postulate 3. *Any ϕ_i shows rotational and reciprocal transformations alternately during any qt_i .*

$$\forall x(\phi(x) \wedge a(x, R_1R_2R_3\sigma x, R_1R_2R_3\sigma\sigma x))$$

$\phi(x)$: *x is a three-dimensional spirit.*

$a(x, y, z)$: *x shows y in half time and shows z in another half time during any qt .*

σ is the reciprocal operator, $\forall x$, $\sigma x = 1/x$, $\sigma\sigma x = x$.

$$R_1 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & \cos\theta_1 & \sin\theta_1 \\ 0 & -\sin\theta_1 & \cos\theta_1 \end{pmatrix}, \quad R_2 = \begin{pmatrix} \cos\theta_2 & 0 & -\sin\theta_2 \\ 0 & 1 & 0 \\ \sin\theta_2 & 0 & \cos\theta_2 \end{pmatrix}, \quad R_3 = \begin{pmatrix} \cos\theta_3 & \sin\theta_3 & 0 \\ -\sin\theta_3 & \cos\theta_3 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

Because reciprocal transformation will turn the coordinate origin to be a spherical surface at infinity, so $\sigma\vec{\phi}$ will become a vector with infinite norm, by Postulate 1 , ϕ can not identify $\sigma\vec{\phi}$.

Because time is the quantity of measuring changes, the reciprocal transformation is a kind of change, time can be further defined as the subjective feelings of ϕ those corresponding to continuous reciprocal transformations, so reciprocal transformations will not affect ϕ to identify any time interval.

Promise θ_1 , θ_2 , θ_3 correspond to three rotation frequencies, denoted by ω_1 , ω_2 , ω_3 , and $\omega_1 > \omega_2 > \omega_3 > 0$. At the positions where distances to the center are γ_1 , γ_2 , γ_3 , the liner velocities at γ_1 , γ_2 , γ_3 will reach to absolute light speed c , then $\gamma_3 > \gamma_2 > \gamma_1 > 0$.

Promise the standard space interval unit $\gamma_3 = 1$, all the points those distance from the center of ϕ is γ_3 will be the reciprocal transformation fixed point. Define the spherical surfaces which radius are γ_1 , γ_2 , γ_3 as three logical interfaces of ϕ , being named γ_1 , γ_2 , γ_3 interface.

When the radius is longer than γ_1, the linear velocity of a certain degree of freedom will not be identified by ϕ because of superluminal, superluminal means the relationship has out of the logic chain of ϕ , then $\vec{\phi}$ only remains two rotational degrees of freedom. The same way, when the radius is longer than γ_2 , $\vec{\phi}$ will only remain one rotational degree of freedom, when the radius is longer than γ_3 , $\vec{\phi}$ will have not any intrinsic rotation.

Next we regard ϕ_i as static. By Postulate 2 , $E\phi_{ij}$ is the image of $E\phi_i$ at $2qt$ before, then by Postulate 3 , exist a time difference angle θ between $E\phi_{ij}$ and $E\phi_i$, θ denotes the angle that ϕ_i swept during $2qt$. The definition of fine structure constant $\alpha \triangleq \cos\theta$, that means α is the projection ratio which $E\phi_i$ mapping to $E\phi_{ij}$.

Because ϕ_{ij} has also infinite contents, so ϕ_i will also identify ϕ_{ij} as a feature vector, denoted by $\vec{\phi}_{ij}$. Define $\vec{\phi}_{ij}$ as the inner image vector of ϕ_{ij} . Since $\vec{\phi}_{ij}$ is the vector that ϕ_i identified once again, then the direction of $\vec{\phi}_{ij}$ will be confirmed by ϕ_i logically.

Assuming the norm of $\vec{\phi}_i$ is γ_3 , if the recognition logic of ϕ_i based on $E\phi_i$, the norm of $\vec{\phi}_{ij}$ is γ_3 , but if the recognition logic of ϕ_i based on $E\phi_{ij}$, the norm of $\vec{\phi}_{ij}$ will be $\alpha\gamma_3$. Since $\vec{\phi}_{ij}$ has two different norms based on the different angle of views, then ϕ_i needs to determine the causalities according to different events.

3.4 Relative Speed and Relative Light Speed

$\vec{v}$ denotes relative speed, u denotes relative light speed, define $u \triangleq qs_{ij}/qt_i$, where qs_{ij} denotes space quantum of ϕ_{ij} when measuring by qt_i of ϕ_i . Promise the value of $\vec{v}$ between ϕ_i and vacuum quantum ${\phi_{ij}}^2$ is the escape velocity of the vacuum space region, the direction is from the center of gravitational source to the center of vacuum quantum's position.

c_{ij} denotes absolute light speed of ϕ_{ij} , define $c_{ij} \triangleq qs_{ij}/qt_{ij}$, where qt_{ij} denotes time quantum of ϕ_{ij} when measuring by qs_i .

Assuming ϕ_i can set the angle between $\vec{\phi}_{ij}$ and $\vec{\phi}_i$ according to some logical rules, β_{ij} is defined as the attitude angle between $\vec{\phi}_{ij}$ and $\vec{\phi}_i$. Under the premise of not misunderstood, β_{ij} can be abbreviated as β . We can define the relative speed between ϕ_i and ϕ_{ij} by attitude angle β_{ij} .

Postulate 4. *ϕ_i set absolute light speed of ϕ_{ij} as c , set relative light speed of ϕ_{ij} as $u = c\cos\beta_{ij}$, set relative speed value between ϕ_i and ϕ_{ij} as $v = c\sin\beta_{ij}$.*

Relative speed $\vec{v}$, relative light speed u and absolute light speed c are all instantaneous velocities. In this paper, instantaneous velocity is not defined by the ratio of differential distance and differential time, but by the absolute light speed c and the attitude angle β. Instantaneous velocity and average velocity can not be the same physical quantity, we can even believe that average speed has not physical meanings at all.

Because of Postulate 4 and the definition of absolute light speed of ϕ_{ij} , so

$$c = \frac{qs_i}{qt_i} = \frac{qs_{ij}}{qt_{ij}}$$

By the definition of photon, the three dimensions of ${\phi_{ij}}^0$ is completely different from the three dimensions of ϕ_i . Because the space which being extended by the three dimensions of ${\phi_{ij}}^0$ and the background space $E\phi_i$ are mutually orthogonal complement spaces about $E\xi_i$, so no matter how ϕ_i adjust the direction of ${\vec{\phi}_{ij}}^0$, the two vectors respectively in the mutually orthogonal vector spaces can only mutually orthogonal to each other, which indicates that the attitude angle between ${\vec{\phi}_{ij}}^0$ and $\vec{\phi}_i$ can only be $\pi/2$, so the value of relative speed between ${\phi_{ij}}^0$ and ϕ_i can only be absolute light speed c , that means the relative speed between any light quantum and any observer can only be absolute light speed c .

Because $E\phi_i$ and $E\phi_{ij}$ are two different Euclidean spaces, so for ϕ_i, in the view of $E\phi_i$, the relative speed between $\vec{\phi}_{ij}$ and $\vec{\phi}_i$ is $\vec{v}_{ij}$, $\vec{v}_{ij}$ is a vector of $E\phi_i$, but in the view of $E\phi_{ij}$, the relative speed between $\vec{\phi}_{ji}$ and $\vec{\phi}_j$ is $\vec{v}_{ji}$, $\vec{v}_{ji}$ is a vector of $E\phi_j$. It can be seen that $\vec{v}_{ij}$ and $\vec{v}_{ji}$ respectively in different background spaces is a pair of true relative speed vector, they have exactly the same speed value, but have not opposite directions, the directions of the pair of vectors belong to different spaces.

Each of the pair of vectors $\vec{v}_{ij}$ and $\vec{v}_{ji}$ can respectively take a positive or negative value, which means the relative movement of the other side moving toward or away from this side, but $\vec{v}_{ij} \neq -\vec{v}_{ji}$. Because $\vec{v}_{ij}$ and $\vec{v}_{ji}$ are respectively belong to different background spaces, for ϕ_i , the absolute light speed of $E\phi_i$ is the relative light speed of $E\phi_{ij}$, the absolute light speed of $E\phi_{ij}$ is the relative light speed of $E\phi_i$, so there must be ${\vec{v}_{ij}}^2 = -{\vec{v}_{ji}}^2$, that means in the view of ϕ_i , $\vec{v}_{ij}$ is a real velocity vector, $\vec{v}_{ji}$ is an complex velocity vector, the norm of $\vec{v}_{ji}$ is an imaginary value.

3.5 Information Wave and Matter Wave

Assuming ϕ form its rotation center can generate a spherical wave spreading to infinity at the end of each qt , all the spherical waves spread with light speed c . $\triangle t$ denotes the time interval which a spherical wave from a point expand to a spherical surface with radius r, the spherical wave contains all the contents of ϕ in the period of $\triangle t$.

Define this kind of spherical waves as information waves, the contents those contained in the information waves being defined as information, denoted by φ , we can directly use φ represent an information wave. If we regard ϕ as a physical quantity, then the relationship between ϕ and φ can be expressed as $\phi/\triangle t = \varphi \cdot c$ or $\phi = \varphi \cdot r$. If we regard ϕ as a vector field, then φ can be regard as the divergence of ϕ .

Postulate 5. *ϕ_i believes at the end of every qt_i , ξ_i will generate a six dimensional hyper spherically symmetric information wave with absolute light speed c from its rotation center spreading to infinity.*

By Postulate 5 and the definition of inner image, ϕ_i will believe that any of inner images in $E\phi_i$ should generate a three dimensional spherically symmetric information wave at the end of each qt_i . Because only hydrogen atoms have the same intrinsic dimensions compared to ϕ_i , so in the view of ϕ_i, only hydrogen atoms can generate real three-dimensional information waves, other kind of inner images can only generate complex three-dimensional information waves.

Known that ϕ identified $\vec{\phi}$ as a feature point in space, then the intrinsic rotation of $\vec{\phi}$ can be shown as a feature point circular motion at the logic interfaces such as γ_3 interface. h denotes action quantum, action quantum is defined as all the contents of the feature point corresponding to $\vec{\phi}$, the value of action quantum h is equal to Planck's constant.

δ denotes a feature point(a point particle) , because h represents all the contents of a feature point, the logical relations between δ and h will be $\delta \to h$, so for the events of δ , we can regard δ as h directly.

Postulate 6. *If an elementary particle can be identified by ϕ_i, the action of the elementary particle must equal to the action quantum h.*

Because the feature vector of a spirit and the spirit itself represent the same contents in nature, so the total contents inside a spherical information wave of ϕ is equivalent to the total contents of a point particle h with the integral along the motion path. At logical interfaces such as γ_3 interface, the line speed of a quantum h is light speed c , the spreading speed along the radial direction of information waves is also light speed c , so during the time interval $\triangle t$, the movement distance of h must equal to the information wave's radius r .

By Postulate 3 , the reciprocal transformation cause a physical space as the superposition of an ordinary space and a reciprocal symmetric space, assuming ϕ can not distinguish the reciprocal symmetric space in normal physical space, that means the information which ϕ identified is only half of total, so under continuous reciprocal transformation condition, the relationship between h and φ with radius r will be

$$\phi/\triangle t = \varphi \cdot c = 2\int_0^r h ds = 2h \cdot r \tag{3.1}$$

Both sides of Eq(3.1) are multiplied by $k = v/c$, let $x = k \cdot r$, we get

$$\varphi \cdot v = 2\int_0^x h ds = 2h \cdot x \tag{3.2}$$

Eq(3.2) describes the relationship between the information wave φ and the point particle h with relative speed v , it is equivalent to the information wave φ spreading with relative speed v , and the point particle h keeps the revolution with line speed v . Define the logical sense information wave with spreading speed v as pseudo information wave.

Because the feature vector of a pseudo information wave can also being identified three degrees of freedom rotation, so the rotating feature vector's projection can also generate a kind of phase wave, define this kind of phase wave as matter wave.

λ denotes the wavelength of a matter wave, x denotes the radius of a pseudo information wave, define $\lambda \triangleq 2\pi x$. The matter wave and the information wave are different, information wave is the spherical wave, matter wave is the plane phase wave. In this paper, matter waves are only refer to individual inner images or feature vectors, but not refer to any macroscopic objects, it is the difference from traditional theories.

3.6 Structure of Hydrogen Atom

A hydrogen atom is a inner image reflecting the status of ϕ at $2qt$ before, known the cosine of time difference angle is fine structure constant α, then the structure of a hydrogen atom from inside to outside will be

- The ball layer which radius belong to $[\,\alpha qs\,,\,\alpha\gamma_1\,)$, exist three degrees of freedom intrinsic rotation, $\alpha\gamma_1$ is classical radius of proton core, γ_1 is information radius of proton core.
- The ball layer which radius belong to $[\,\alpha\gamma_1\,,\,\alpha\gamma_2\,)$, exist two degrees of freedom intrinsic rotation, $\alpha\gamma_2$ is classical radius of proton, γ_2 is charge radius of proton.

- The ball layer which radius belong to $[\,\alpha\gamma_2\,,\,\alpha\gamma_3\,)$, exist one degree of freedom intrinsic rotation, $\alpha\gamma_3$ is classical radius of positron, γ_3 is charge radius of positron.
- The radius of γ_3/α corresponds to the reciprocal symmetry image of positron's interface, the reciprocal symmetry image of positron's interface is electron's orbital sphere. At the end of every qt , electron's orbital sphere where the feature vector point to being set a mirror image which radius is equal to positron's classical radius, the mirror image is electron.

Although by physical experiments we found the internal structure of hydrogen atom, such as electrons, protons, quarks and so on, it seems to imply that hydrogen atom is composed of sub atomic particles, but all these sub atomic particles can be interpreted as performances reflecting different causalities of a same inner image. Because causalities are for the independent events, observation and recognition in different conditions can form different independent events, so the same inner image can be shown different physical statuses.

The pair of electron and positron belong to the same γ_3 interface in essence, where electron is inner surface, positron is outer surface. The phenomenon that information passing through the same γ_3 interface will be displayed as an event between the pair of logical separated mirror images, the event shows that information being emitted form positron's surface and then being absorbed at electron's surface. ϕ will regard this kind of information relations as interaction between positive and negative charges.

Assuming the events those happened in $E\phi$ will also happen in reciprocal symmetry $\sigma E\phi$. φ_3 denotes the total information those pass through $\alpha\gamma_3$ interface for the first time. Because present electron's outer surface is image of positron's inner surface before $2qt$, so the amount of information passing through electron's surface need to be multiplied by fine structure constant α , it is equivalent to a part of information being absorbed by electron's surface. Because exist a reciprocal symmetry world, so information being absorbed $\alpha\varphi_3$ by electron's surface will reappear from positron's surface with $\alpha^2\varphi_3$, the reappeared information will be absorbed $\alpha^3\varphi_3$ by electron's surface again, the process will go on forever.

It is equivalent to information pass through the positive and negative image's surfaces repeatedly, every time the information will loss a proportion because of time difference angle, the total information those have not being absorbed will be the information amount which a ground state hydrogen atom displayed in macroscopic physical space.

Postulate 7. *Each φ emitted from positron's surface will be absorbed $\alpha\varphi$ by electron's surface, the absorbed $\alpha\varphi$ will reappear with $\alpha^2\varphi_3$ after $2qt$, the process of emission and absorption between positron and electron will go on forever.*

φ_e denotes an information unit, the definition of φ_e is total information amount those a ground state hydrogen atom finally displayed. By Postulate 7 , the relationship between φ_e and φ_3 will be

$$\varphi_e = \varphi_3 \sum_{i=0}^{\infty} (-\alpha)^i = \varphi_3 \frac{1-(-\alpha)^{\infty}}{1+\alpha} = \frac{\varphi_3}{1+\alpha} \tag{3·3}$$

Postulate 8. *Each proton corresponds to a positron, proton's information distribution surface is round face, positron's information distribution surface is spherical surface, the information amount contained in proton or positron are the same.*

Because γ_2 interface is a proton, from γ_2 interface to γ_3 interface, $\vec{\phi}$ can only show intrinsic rotation with single degree of freedom, so ϕ in the region of γ_2 interface to γ_3 interface can only identify two-dimensional round face. Because the logical relations of ϕ in this region is two-dimensional, so it can

be assumed that once ϕ identifies a proton outside γ_2 interface, ϕ will regard proton's information distribution surface as round face but not spherical surface.

4 Physical Quantity

According to the axiom system based on spirit, we can clear the internal logical relations of physical quantities, the definition of some important physical quantities as follows.

1. Information φ

$$\varphi \triangleq \nabla \cdot \phi \tag{4.1}$$

Here we give ϕ and φ some delimitations, promise ϕ represent the physical performance of consciousness, ϕ can be regard as a physical quantity. φ is also a physical quantity, represents the physical performance of information. ϕ is a vector field, φ is a scalar field.

2. Action A

$$A \triangleq \frac{d\varphi}{2dt} \tag{4.2}$$

Where $1/2$ means because exist the continuous reciprocal transformations, so action can only correspond to $1/2$ information amount.

3. Field mass m_f

$$m_f \triangleq \frac{\varphi}{S} \tag{4.3}$$

Where S is total area of the information distribution surface. Under normal circumstances, the information distribution surface refers to the information wavefront.

4. Particle mass m

$$m \triangleq \frac{m_f}{\sin^2 \beta} \tag{4.4}$$

Where $\sin \beta = v/c$, v is velocity value of a particle. The mass of macroscopic objects is algebraic sum of all the particle's mass in a macroscopic object.

5. Field momentum p

$$p \triangleq 2\pi m_f c \tag{4.5}$$

6. Vector field momentum $\vec{p}$

$$\vec{p} \triangleq 2\pi m_f \vec{c} \tag{4.6}$$

7. Energy E

$$E \triangleq \frac{dA}{dt} \tag{4.7}$$

8. Force field $\vec{F}$

$$\vec{F} \triangleq \nabla E \tag{4.8}$$

9. Electric field $\vec{E}$

$$\vec{E} \triangleq \frac{\alpha c}{e}(\nabla p + i \nabla \times \vec{p}) \tag{4.9}$$

Where e is electron charge, α is fine structure constant, i is imaginary unit.

10. Magnetic field $\vec{B}$

$$\vec{B} \triangleq \frac{\alpha}{e}(i \nabla p - \nabla \times \vec{p}) \tag{4.10}$$

5 Theorem

Theorem 1. *β denotes the angle between $\vec{\phi}_{xi}$ and $\vec{\phi}_{xj}$, v denotes the relative speed value between $\vec{\phi}_{xi}$ and $\vec{\phi}_{xj}$. In the view of ϕ_x , $\cos\beta$ will be*

$$\cos\beta = \frac{u}{c} = \sqrt{1 - \frac{v^2}{c^2}}$$

Proof. Without loss of generality, assuming ϕ_x regards $\vec{\phi}_{xi}$ as a relative static object. In the view of ϕ_x , by Postulate 4 , the relative speed between $\vec{\phi}_x$ and $\vec{\phi}_{xj}$ will be $v = c\sin\beta$, the relative light speed of $\vec{\phi}_{xj}$ will be $u = c\cos\beta$.

After a simple trigonometric transformation, $\cos\beta$ which ϕ_x identified will be

$$\cos\beta = \frac{u}{c} = \sqrt{1 - \frac{v^2}{c^2}}$$

□

Theorem 2. *qs_i denotes space quantum of ϕ_i , qs_{ij} denotes space quantum of ϕ_{ij} , β_{ij} denotes the angle between $\vec{\phi}_i$ and $\vec{\phi}_{ij}$. The relationship between qs_i and qs_{ij} will be*

$$\frac{qs_{ij}}{qs_i} = \cos\beta_{ij}$$

Proof. By Postulate 4 , in the view of ϕ_i , the relative light speed of $\vec{\phi}_{ij}$ will be

$$u = c \cdot \cos\beta_{ij} = \frac{qs_{ij}}{qt_i}$$

the definition of $c = qs_i/qt_i$, then

$$qs_{ij} = c \cdot qt_i \cdot \cos\beta_{ij} = qs_i \cdot \cos\beta_{ij}$$

finishing as

$$\frac{qs_{ij}}{qs_i} = \cos\beta_{ij}$$

□

Theorem 3. *qt_i denotes time quantum of ϕ_i , qs_{ij} denotes in the view of ϕ_i , time quantum of ϕ_{ij} , β_{ij} denotes the angle between $\vec{\phi}_i$ and $\vec{\phi}_{ij}$. The relationship between qt_i and qs_{ij} will be*

$$\frac{qt_{ij}}{qt_i} = \cos\beta_{ij}$$

Proof. By Postulate 4 , in the view of ϕ_i , the relative light speed of $\vec{\phi}_{ij}$ will be

$$u = c \cdot \cos\beta_{ij} = \frac{qs_{ij}}{qt_i}$$

then

$$\frac{1}{qt_i} = \frac{c \cdot \cos\beta_{ij}}{qs_{ij}} = \frac{\cos\beta_{ij}}{qt_{ij}}$$

finishing as

$$\frac{qt_{ij}}{qt_i} = \cos\beta_{ij}$$

□

Theorem 4. *m_s denotes the rest mass of an object, m_v denotes the moving mass of the same object. The relationship between m_s and m_v will be*

$$\frac{m_s}{m_v} = \cos\beta$$

Proof. $\dot{\varphi}$ denotes information quantum, define $\dot{\varphi}$ as the most information amount an elementary particle generated in principle, by Eq(3.1) , $\dot{\varphi} = 2h \cdot qs/c$. $\dot{m}$ denotes mass quantum, define $\dot{m}$ as the maximum mass of an elementary particle which can be identified by ϕ . $\hbar$ denotes reduced Planck's constant, $\hbar = h/2\pi$.

By Postulate 6 , the action of any elementary particle will be h . $\dot{m}_s$ denotes rest mass quantum, by Eq(3.1) and Eq(4.3) , $\dot{m}_s$ can be defined as

$$\dot{m}_s \triangleq \frac{\dot{\varphi}}{4\pi qs^2} = \frac{2hqs}{4\pi cqs^2} = \frac{h}{2\pi cqs} = \frac{\hbar}{cqs} \tag{5.1}$$

$\dot{m}_v$ denotes moving mass quantum, when the relative speed of an inertial moving object is $\vec{v}$, by Theorem 2 , the space quantum qs along the velocity direction will be $qs\cos\beta$, so in the view of ϕ, $\dot{m}_v$ will be

$$\dot{m}_v = \frac{\hbar}{cqs\cos\beta} = \frac{\dot{m}_s}{\cos\beta}$$

Assuming m_s contains k rest mass quantum $\dot{m}_s$, then m_v contains k moving mass quantum $\dot{m}_v$, the relationship between m_s and m_v will be

$$\frac{m_s}{m_v} = \frac{k \cdot \dot{m}_s}{k \cdot \dot{m}_v} = \cos\beta$$

□

Theorem 5. *P_i denotes a moving point, ϕ_i denotes the observer who regard P_i as a relative static point, $\vec{v}_{ij}$ denotes the relative speed between P_i and P_j , β_{ij} denotes the angle between the two inner images projected onto P_i and P_j , qt_{ij} denotes time quantum of ϕ_j which ϕ_i identified. Promise that $\vec{v}_{13}$ is speed synthetic results of $\vec{v}_{12}$ and $\vec{v}_{23}$, θ denotes the angle between $\vec{v}_{12}$ and $\vec{v}_{23}$ which ϕ_1 identified. In the view of ϕ_1 , the speed synthetic formula will be*

$$v_{13}^2 = v_{12}^2 + v_{23}^2 - \frac{v_{12}^2 v_{23}^2}{c^2} + 2\vec{v}_{12}\vec{v}_{23}\cos\beta_{12}\cos\beta_{23}\cos\theta$$

Proof. By Theorem 3 , ϕ_1 believes P_2 exist time dilation, so qt_{12} of P_2 will be

$$qt_{12} = qt_1\cos\beta_{12} \tag{5.2}$$

ϕ_1 believes P_3 exist time dilation, so qt_{13} of P_3 will be

$$qt_{13} = qt_1\cos\beta_{13} \tag{5.3}$$

ϕ_2 believes P_3 exist time dilation. Assuming $\vec{v}_{12} \perp \vec{v}_{23}$, because under this condition, the velocity component of $\vec{v}_{23}$ along the direction of $\vec{v}_{12}$ is 0 , then time quantum of P_3 being identified by ϕ_2 is equivalent to being identified by ϕ_1 . As long as $\vec{v}_{12} \perp \vec{v}_{23}$

$$qt_{13} = qt_{12}\cos\beta_{23} \tag{5.4}$$

By Eq(5.2), Eq(5.3) and Eq(5.4)

$$\frac{\cos\beta_{12}}{\cos\beta_{13}} = \frac{1}{\cos\beta_{23}} \tag{5.5}$$

where

$$\cos\beta_{12} = \sqrt{1 - \frac{v_{12}^2}{c^2}}$$

$$\cos\beta_{13} = \sqrt{1 - \frac{v_{13}^2}{c^2}}$$

$$\cos\beta_{23} = \sqrt{1 - \frac{v_{23}^2}{c^2}}$$

Put them into Eq (5.5) , then

$$v_{13}^2 = v_{12}^2 + v_{23}^2 - \frac{v_{12}^2 v_{23}^2}{c^2} \tag{5.6}$$

Extend to general conditions, by parallelogram law of vector synthesis

$$c^2 = a^2 + b^2 + 2ab\cos\theta$$

Eq (5.6) should increase the cosine correction term $2\vec{v}_{12}\vec{v}_{23}\cos\theta$.

Because in the view of ϕ_1 , the length unit of $\vec{v}_{12}$ and $\vec{v}_{23}$ corresponding to P_2 and P_3 will have length contraction effect, so $2\vec{v}_{12}\vec{v}_{23}\cos\theta$ should be changed into $2\vec{v}_{12}\vec{v}_{23}\cos\beta_{12}\cos\beta_{23}\cos\theta$. After corrected Eq(5.6) , the speed synthetic formula will be

$$v_{13}^2 = v_{12}^2 + v_{23}^2 - \frac{v_{12}^2 v_{23}^2}{c^2} + 2\vec{v}_{12}\vec{v}_{23}\cos\beta_{12}\cos\beta_{23}\cos\theta$$

□

Theorem 6. *r denotes the radius of a spherically symmetric information wave, p denotes the field momentum which position corresponds to r , $\vec{P}$ denotes the traditional momentum of a particle, $\vec{x}$ denotes the displacement vector of the particle, h denotes Planck's constant. Exist the following relationship*

$$p \cdot r = \vec{P} \cdot 2\pi\vec{x} = h$$

If the particle is a proton, then

$$p \cdot r = \vec{P} \cdot 2\pi\vec{x} = 4h$$

Proof. By Postulate 5 , Eq(3.1) and Eq(3.2) , we get $\varphi = 2hr/c = 2hx/v$, where φ is the total information those in the information wavefront which radius is r .

By the definition of field mass, at the position where the radius of the information wave is r , the field mass will be

$$m_f = \frac{\varphi}{4\pi r^2} = \frac{2hr}{4\pi c r^2} = \frac{h}{2\pi c r}$$

Known the definition of field momentum $p = 2\pi m_f c$, then

$$2\pi m_f c \cdot r = p \cdot r = h$$

By the definition of pseudo information wave, the displacement vector's norm is equal to the pseudo information wave's radius. By the definition of particle mass, the elementary particle's mass will be

$$m = \frac{\varphi}{4\pi x^2} = \frac{2hx}{4\pi v x^2} = \frac{h}{2\pi v x}$$

The definition of traditional momentum is $\vec{P} \triangleq m\vec{v}$, then action theorem will be

$$p \cdot r = \vec{P} \cdot 2\pi\vec{x} = h$$

By Postulate 8 and the definition of field mass, proton's field mass will be $\varphi/\pi r^2$, so proton's action relationship will be

$$p \cdot r = \vec{P} \cdot 2\pi\vec{x} = 4h$$

□

Theorem 7. *U denotes the traditional position potential energy corresponding to the traditional momentum, $\hbar$ denotes reduced Planck's constant, δ denotes a particle, X denotes a space position, r denotes the distance between δ and X , φ denotes the information amount which δ generated. The position potential energy of X which δ contributed will be*

$$U = -\frac{\hbar c}{r} = -m_f c^2$$

Proof. Known that U of X which contributed by δ fully come from the information wave φ . By Theorem 6 we get

$$\vec{P} \cdot \vec{x} = m_f c \cdot r = \hbar$$

Because φ can be restored to a point by time inversion, so the interval of time inversion process will be $\triangle t = r/c$. By Eq (4.7) , the relationship between U and action A will be

$$A = \int_{r/c}^{0} U dt = \hbar$$

After integral we get

$$U = -\frac{\hbar c}{r} = -m_f c^2$$

□

Theorem 8. *λ denotes the wavelength of a matter wave, h denotes action quantum, m denotes a particle's moving mass, v denotes the particle's relative speed. The wavelength of a matter wave will be*

$$\lambda = \frac{h}{mv}$$

Proof. x denotes the radius of a pseudo information wave which corresponding to a particle. By the definition of λ we get

$$\lambda = 2\pi x = \frac{2\pi \cdot mv \cdot x}{mv}$$

By Theorem 6 we get $2\pi m\vec{v} \cdot \vec{x} = h$, known that the displacement vector's norm is equal to the pseudo information wave's radius, then

$$\lambda = \frac{h}{mv}$$

□

Theorem 9. *The total action amount of an isolated system remains constant.*

$$\sum_{i=1}^{n} \vec{P}_i \vec{x}_i = n\hbar$$

Proof. By Theorem 6 we get

$$\vec{P} \cdot \vec{x} = \hbar$$

Assuming exist n elementary particles in an isolated system, the total number of those particles can be considered conservation, so

$$\sum_{i=1}^{n} \vec{P}_i \vec{x}_i = n\hbar$$

□

6 Basic Laws of Mechanics

6.1 Momentum Conservation Law

If the net force acting on an object system is zero, then the resultant momentum vector of objects in the object system maintaining conservation, the system's centroid will maintain the original movement state. The mathematical form can be expressed as

$$\frac{d}{dt}\sum_{i=1}^{n}\vec{P}_i = 0$$

Proof. Assuming there are m objects in the object system, any object includes limited particles. k_i denotes the total number particles of the $i\text{-}th$ object, η denotes a constant, then the total number particles of the object system will be

$$n = \sum_{i=1}^{m} k_i = \eta$$

By Theorem 6 , $\vec{P}\cdot\vec{x} = \hbar$, because all the particles in an object have same momentum, so all the radiuses of those particles's pseudo information waves have same value x .

$\vec{\eta}$ denotes a constant vector, by Theorem 9 , the relationship between momentum and action of all the particles in any object will be

$$\sum_{i=1}^{k}\vec{P}_i = \frac{k\hbar}{\vec{x}} = \vec{\eta}$$

When the net force acting on the object system is zero, the total momentum of the system will be

$$\sum_{i=1}^{n}\vec{P}_i = \sum_{i=1}^{k_1}\vec{P}_{1i} + \sum_{i=1}^{k_2}\vec{P}_{2i} + \cdots + \sum_{i=1}^{k_m}\vec{P}_{mi} = \frac{k_1\hbar}{\vec{x}_1} + \frac{k_2\hbar}{\vec{x}_2} + \cdots + \frac{k_m\hbar}{\vec{x}_m} = \vec{\eta}$$

Derivative the equation, we get momentum conservation law.

$$\frac{d}{dt}\sum_{i=1}^{n}\vec{P}_i = 0$$

□

6.2 Newton's Second Law

Assuming the net force $\vec{F}$ acting on a particle which mass is m , the particle being produced a small displacement $\triangle\vec{x}$ along the direction of $\vec{F}$.

The definition of acceleration is $\vec{a} \triangleq d\vec{v}/dt$. By Eq(4.8) , the variation of the particle's kinetic energy along the direction of $\vec{F}$ will be

$$\triangle E_k = \vec{F}\cdot\triangle\vec{x}$$

By Theorem 6 , the differential of the particle's action is

$$dA = \triangle\vec{x}\cdot d(m\vec{v})$$

By Eq(4.7)

$$\triangle E_k = \frac{dA}{dt} = \frac{d(m\vec{v})}{dt}\triangle\vec{x} = \vec{F}\cdot\triangle\vec{x}$$

So the accurate expression of Newton's second law will be

$$\vec{F} = \frac{d(m\vec{v})}{dt} = m\frac{d\vec{v}}{dt} + \vec{v}\frac{dm}{dt} = m\vec{a} + \vec{v}\frac{dm}{dt}$$

7 Gravity and Gravitational Field

7.1 The Law of Gravity

Consider the gravity between two particles A and B. To simplify the analysis, suppose the rest mass of A and B are all equal to the rest mass quantum $\dot{m}_s$. Because potential energy can be regarded as a kind of divergence field, and the divergence field can be superimposed on each other, so the position potential energy between A and B can be superimposed on each other.

By Theorem 7 , particle A can affect the position potential energy where particle B located. Known that energy changes relate action changes. Suppose B can be identified somewhere at a time point, once the potential energy where B located being superimposed by the potential energy those A contributed, then B will disappear because the action of its position is no longer h , a new particle which have not any difference from B will appear nearby where the action is equal to h and satisfied the observer's causality.

By the definition of force field, in a potential energy field, the position change trend of B can be expressed as the gravitational force. By Theorem 7 , the superimposed potential energy those A contributed to B will be

$$U = -\frac{\hbar c}{r}$$

$\vec{1}$ denotes the unit vector, then the gravitational force between A and B will be

$$\vec{F_0} = \frac{dU}{dr}\vec{1} = \frac{\hbar c}{r^2}\vec{1} \tag{7.1}$$

By Eq(5.1) , $\hbar = \dot{m}_s cqs$. Assuming there are k_1 rest mass quantum in object 1 , the total mass of object 1 is $m_1 = k_1\dot{m}_s$, there are k_2 rest mass quantum in object 2 , the total mass of object 2 is $m_2 = k_2\dot{m}_s$, then the gravity between the two objects will be

$$\vec{F} = \sum_{i=1}^{k_1}(\sum_{j=1}^{k_2}\vec{F_0}) = k_1 \cdot k_2 \cdot \frac{\hbar c}{r^2}\vec{1} = k_1\dot{m}_s \cdot k_2\dot{m}_s \cdot \frac{c^2 qs}{\dot{m}_s r^2}\vec{1} = m_1 m_2 \cdot \frac{c^2 qs}{\dot{m}_s r^2}\vec{1}$$

Define gravitational constant as

$$G \triangleq \frac{c^2 qs}{\dot{m}_s} = \frac{\hbar c}{\dot{m}_s^2}$$

Then law of gravity will be

$$\vec{F} = G\frac{m_1 m_2}{r^2}\vec{1} \tag{7.2}$$

Because the information wave spreading with absolute light speed c , so the effect speed of gravity must be absolute light speed c .

7.2 Gravity under Astronomical Scale

S denotes a gravitational source, M_0 denotes the real mass of S . P denotes a spatial point out of S . r denotes the distance between P and the centroid of S . ε denotes potential energy quantum. $U(r)$ denotes the potential energy those S contributed to P . $\vec{F}(r)$ denotes the the gravitational force which the distance from the gravitational source is r .

By Theorem 7 , it must exist the distance $\dot{r}_0$ cause $|U(\dot{r}_0)| = \varepsilon$, when $r > \dot{r}_0$ then $|U(r)| < \varepsilon$, so ϕ will believe $U(r) = 0$ because the value of $U(r)$ is too small to be processed. That means if $r > \dot{r}_0$ then $\vec{F}(r) = 0$, $\dot{r}_0$ is the maximum range being effected by S , so the range of gravity is limited.

X denotes an object located at P , m_0 denotes the real mass of X and $m_0 < M_0$. Because X can also effect S , so when considering X effect S , by Theorem 7 , there must be a distance $\dot{x}_0$ cause

$|U(\dot{x}_0)| = \varepsilon$. Because $m_0 < M_0$, so $\dot{x}_0 < \dot{r}_0$, that means the gravity's range of S is longer than the gravity's range of X . When the distance between S and X is longer than $\dot{x}_0$ and less than $\dot{r}_0$, S can impose gravity on X , but X can not impose gravity on S , so under this condition the gravity is one-way effect.

Because analysis X effects S is similar to analysis S effects X , without loss of generality, here analysis S effects X .

$\mathbb{N}^+$ denotes the set of natural numbers without 0 , $\forall k \in \mathbb{N}^+$, if $L_k = \dot{r}_{k-1} - \dot{r}_k > qs$ and $U(\dot{r}_{k-1}) - U(\dot{r}_k) = \varepsilon$, then define L_k as the k-th free distance of S , define $\dot{r}_k$ as the k-th standard distance of S . By Eq(7.2) , the minimum non-zero gravity which S imposes to X will be

$$\vec{F}(\dot{r}_0) = G\frac{M_0 m_0}{\dot{r}_0^2}\vec{1}$$

Considering X in L_k of S . Known the gravity from S at the k-th standard distance $\dot{r}_k$ can be expressed as

$$\vec{F}(\dot{r}_k) = G\frac{M_0 m_0}{\dot{r}_k^2}\vec{1}$$

When $r \in (\dot{r}_k, \dot{r}_{k-1})$, let $\triangle r = r - \dot{r}_k$. Because $\triangle r$ does not big enough to cause at least ε potential energy's change amount, so ϕ will believe that $\triangle U(r) = 0$. By the definition of force field, the change amount of gravity nearby the position r will be

$$\triangle\vec{F}(r) = \frac{\triangle U(r)}{\triangle r} = 0$$

So the gravitational relations in L_k will be

$$\vec{F}(r) = \vec{F}(\dot{r}_k) - \triangle\vec{F}(r) = G\frac{M_0 m_0}{\dot{r}_k^2}\vec{1} = \vec{\eta}$$

Assuming exist logical mass change effect in L_k , shown as

$$M = M_0\frac{r}{\dot{r}_k} \tag{7.3}$$

and

$$m = m_0\frac{r}{\dot{r}_k} \tag{7.4}$$

Then the gravity equation in L_k will be

$$\vec{F}(r) = G\frac{Mm}{r^2}\vec{1} = \vec{\eta} \tag{7.5}$$

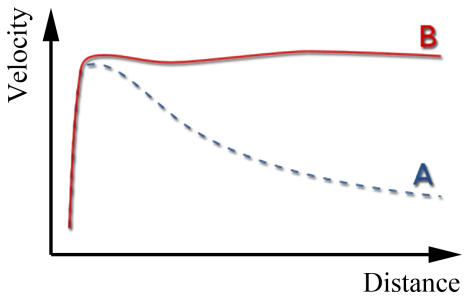

Figure 1: Rotation curve of a typical spiral galaxy

Assuming the free distance L_k at the edge of distant galaxies is a macroscopic distance, satisfied with Eq(7.5) , then in L_k , the mass of stars will have corresponding logical changes, if the centripetal force entirely from gravity, then

$$\vec{F}(r) = G\frac{Mm}{r^2}\vec{1} = m\frac{v^2}{r}\vec{1} = m_0\frac{r}{\dot{r}_k}\frac{v^2}{r}\vec{1} = m_0\frac{v^2}{\dot{r}_k}\vec{1} = \vec{\eta}$$

Because m_0 and $\dot{r}_k$ are all constants, so in L_k , the line speed of stars those at the edge of galaxies will remain constant. In Figure 1 , A is expected curve under Newton's law of gravity, B is observed curve. Obviously without the introduction of dark matter, as long as following Eq (7.5) , it will meet curve B very well.

7.3 Gravitational Red Shift

M denotes the mass of the gravitational source. At the position where the distance from gravitational source center is r , the escape velocity will be

$$v = \sqrt{\frac{2GM}{r}}$$

By Postulate 4

$$v^2 = c^2 - u^2 = c^2(1 - \cos^2\beta) = \frac{2GM}{r}$$

By Theorem 3

$$\frac{qt_{ij}}{qt_i} = \sqrt{1 - \frac{2GM}{c^2 r}} \tag{7.6}$$

f_0 denotes the original frequency of spectrum, f denotes the observed frequency of spectrum, z denotes red shift value. The definition of z is

$$z \triangleq \frac{f_0 - f}{f} \tag{7.7}$$

qt_i denotes time quantum of observer ϕ_i away from the gravitational source, qt_{ij} denotes time quantum of light source which ϕ_i identified. Let $qt_i = 1/kf$, $qt_{ij} = 1/kf_0$, where $k \in \mathbb{R}^+$. After putting the two time quantum into Eq(7.6) and Eq(7.7) , the gravitational red shift formula will be

$$z = (1 - \frac{2GM}{c^2 r})^{-\frac{1}{2}} - 1 \tag{7.8}$$

7.4 Gravitational Red Shift under Astronomical Scale

M_0 denotes the real mass of a gravitational source, r_0 denotes the radius of gravitational source's luminous interface. By Eq(7.8) , the gravitational red shift value at luminous interface will be

$$z_0 = (1 - \frac{2GM_0}{c^2 r_0})^{-\frac{1}{2}} - 1$$

Assuming the k-th free distance L_k is macroscopic distance, when $r \in (\dot{r}_k, \dot{r}_{k-1})$, by Eq(7.3) , the mass of gravitational source will be

$$M = M_0\frac{r}{\dot{r}_k}$$

So the gravitational red shift value will be corrected to

$$z = (1 - \frac{2GM}{c^2 r_0})^{-\frac{1}{2}} - 1 = (1 - \frac{2GM_0}{c^2 r_0 \dot{r}_k} \cdot r)^{-\frac{1}{2}} - 1$$

Because G , M_0 , c , r_0 , $\dot{r}_k$ are all constants, so

$$\frac{2GM_0}{c^2 r_0 \dot{r}_k} = \eta$$

Then the gravitational red shift formula under astronomical scale will be

$$z = \frac{1}{\sqrt{1-\eta \cdot r}} - 1 \tag{7.9}$$

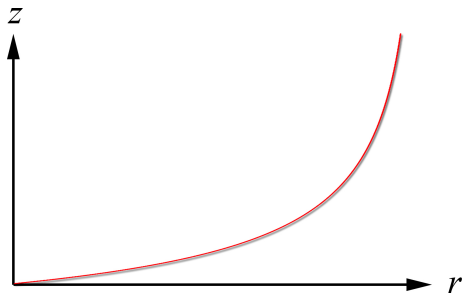

Figure 2: Gravitational Red Shift under Astronomical Scale

The function image of Eq (7.9) can be shown as Figure 2 , it meets the cosmological red shift observations well based on the static model of universe. When $r = \dot{r}_0$, it can be considered that the luminous interface radius of the gravitational source is exactly equal to the Schwarzschild radius which being identified by the observer whose position is $\dot{r}_0$, once the observer's position farther than $\dot{r}_0$, it can be considered that any light can not escape the gravitational source, and will not feel any gravitational force, this may explain the Olbers' paradox well.

7.5 Spherically Symmetric Gravitational Field

S denotes a spherically symmetric gravitational source, M denotes mass of S , P denotes a spatial point outside S , the coordinate of P is $P(r,\theta,\varphi)$, ϕ_0 denotes an observer at a spatial point outside S . Known that the escape velocity of P is equal to the relative velocity of vacuum quantum located at $P(r,\theta,\varphi)$, the escape velocity of P can be expressed as

$$v = \sqrt{\frac{2GM}{r}}$$

In the view of ϕ_0 , the line element vector which described by absolute light speed c at $P(r,\theta,\varphi)$ should be

$$\vec{c}dt = d\vec{r} + \vec{r}d\theta + \vec{r}\sin\theta d\varphi$$

Because P contains escape velocity, then in the view of ϕ_0 , P is equivalent to an inertial moving point with relative speed $\vec{v}$ along the radius, so the line element vector $\vec{c}dt$ has been caused length contraction by escape velocity, that means all the vacuum positions outside S have been contained the length contraction because of escape velocities.

Assuming exist an observer at P , denoted by ϕ_1 . Because in the view of ϕ_0 , the vacuum quantum relative to ϕ_1 must be stationary, so ϕ_0 will believe that in the view of ϕ_1 , the line element vector $\vec{c}dt$ of $P(r,\theta,\varphi)$ need to be restored the status before the length contraction. ϕ_0 will also believe that in the view of ϕ_1 , absolute light speed c and relative light speed u need to be exchanged, so ϕ_0 will believe the relationship in the the view of ϕ_0

$$v^2dt^2 = c^2dt^2 - u^2dt^2$$

need to be changed into the relationship in the view of ϕ_1

$$v^2dt^2 = u^2dt^2 - c^2dt^2$$

Known that any two vectors among $d\vec{r}$, $\vec{r}d\theta$ and $\vec{r}\sin\theta d\varphi$ are orthogonal each other, the directions of $d\vec{r}$ and $\vec{v}$ are exactly the same. By Theorem 2 , for $\vec{c}dt$ of $P(r,\theta,\varphi)$, only the velocity component along the direction $d\vec{r}$ has length contraction. After restored $d\vec{r}$ to $d\vec{r}/\cos\beta$, by Pythagorean theorem, the relationship of the line element vector can be expressed as

$$c^2dt^2 = \frac{dr^2}{\cos^2\beta} + r^2d\theta^2 + r^2\sin^2\theta d\varphi^2$$

Because $u = c\cos\beta$, so the logical relationship of $P(r,\theta,\varphi)$ outside S will be

$$v^2dt^2 = c^2dt^2\cos^2\beta - \frac{dr^2}{\cos^2\beta} - r^2(d\theta^2 + \sin^2\theta d\varphi^2) \tag{7.10}$$

By Theorem 1 and definition of escape velocity

$$\cos^2\beta = 1 - \frac{2GM}{c^2r}$$

So Eq(7.10) is equivalent to the Schwarzschild exterior solution of Einstein field equation.

$$ds^2 = c^2(1 - \frac{2GM}{c^2r})dt^2 - (1 - \frac{2GM}{c^2r})^{-1}dr^2 - r^2(d\theta^2 + \sin^2\theta d\varphi^2)$$

8 Quantum Theory

8.1 Schrödinger Equation

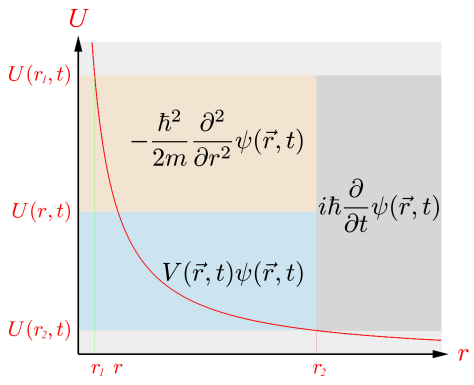

Figure 3: The meaning of Schrödinger equation

As shown in Figure 3 , $\vec{r}$ denotes a position vector, t denotes a time point, $U(\vec{r},t)$ denotes the potential energy of position $\vec{r}$ at t . Because time and space are all quantized, so elementary particles can only appear at the positions of orbits those determined by action quantum h and integer multiples of space quantum, similar to r_1 or r_2 .

Known that matter wave is a kind of phase wave, A denotes wave amplitude, $\vec{k}$ denotes wave vector, ω denotes angular frequency, then the wave function of matter waves by plural forms can be expressed as

$$\psi(\vec{r},t) = Ae^{i(\vec{k}\vec{r}-\omega t)} \tag{8.1}$$

Observed behavior can be regarded as a kind of data processing, any particle need being identified to be a particle, but wave function $\psi(\vec{r},t)$ does not involve any identification, because it does not relate the data processing capacity those limited by Postulate 1 , so $\psi(\vec{r},t)$ can corresponds to the continuous contents.

Without loss of generality, let $\vec{r}$ of $\psi(\vec{r},t)$ point to space regain (r_1,r_2) , by Theorem 7 , $U(\vec{r},t)$ corresponding to $\psi(\vec{r},t)$ will among $U(\vec{r}_1,t)$ and $U(\vec{r}_2,t)$. Because ϕ can not construct a particle out of orbit radius, so it can be assumed that the potential energy's changes between any two adjacent energy levels corresponding to two orbit radius can not be identified. If potential energy's change is big enough to reach the potential difference between adjacent energy levels, it will be expressed the energy level transition.

Assuming the potential energy's difference between two energy levels corresponds to the angular frequency of a matter wave, ω denotes the angular frequency of the matter wave which corresponding to potential difference, then orbital potential energy's difference between $U(\vec{r}_1,t)$ and $U(\vec{r}_2,t)$ will be

$$U(\vec{r}_1,t)-U(\vec{r}_2,t)=\hbar\omega$$

Derivative Eq(8.1) by time

$$\frac{\partial}{\partial t}\psi(\vec{r},t)=-i\omega\psi(\vec{r},t)$$

So

$$U(\vec{r}_1,t)\psi(\vec{r},t)-U(\vec{r}_2,t)\psi(\vec{r},t)=i\hbar\frac{\partial}{\partial t}\psi(\vec{r},t) \tag{8.2}$$

By the definition of wave vector $\vec{k}$ and Theorem 6 , we get $\hbar\vec{k}=m\vec{v}$. For two order partial derivative on Eq(8.1) by r , we get

$$\frac{\partial^2}{\partial r^2}\psi(\vec{r},t)=-k^2\psi(\vec{r},t)$$

Assuming the difference between $U(\vec{r}_1,t)$ and $U(\vec{r},t)$ can be expressed as the kinetic energy of the particles

$$U(\vec{r}_1,t)-U(\vec{r},t)=\frac{1}{2}mv^2$$

Then

$$U(\vec{r}_1,t)\psi(\vec{r},t)-U(\vec{r},t)\psi(\vec{r},t)=-\frac{\hbar^2}{2m}\frac{\partial^2}{\partial r^2}\psi(\vec{r},t) \tag{8.3}$$

The definition of $V(\vec{r},t)$ is the difference between $U(\vec{r},t)$ and $U(\vec{r}_2,t)$, $V(\vec{r},t)$ can span multiple orbital energy.

$$V(\vec{r},t)\triangleq U(\vec{r},t)-U(\vec{r}_2,t)$$

The energy equation being related with $\psi(\vec{r},t)$ will be

$$V(\vec{r},t)\psi(\vec{r},t)=U(\vec{r},t)\psi(\vec{r},t)-U(\vec{r}_2,t)\psi(\vec{r},t) \tag{8.4}$$

Combined Eq(8.2) , Eq(8.3) and Eq(8.4) , we get one-dimensional Schrödinger equation

$$i\hbar\frac{\partial}{\partial t}\psi(\vec{r},t)=-\frac{\hbar^2}{2m}\frac{\partial^2}{\partial r^2}\psi(\vec{r},t)+V(\vec{r},t)\psi(\vec{r},t)$$

It can be extended to three-dimensional Schrödinger equation

$$i\hbar\frac{\partial}{\partial t}\psi(\vec{r},t)=-\frac{\hbar^2}{2m}\nabla^2\psi(\vec{r},t)+V(\vec{r},t)\psi(\vec{r},t)$$

8.2 Wave Equation of Moving Object

∇ denotes Hamiltonian operator, ∇_s denotes Hamiltonian operator under stationary conditions. Because in physical space, ∇ has length contraction effect, so when we use ∇ to analysis a moving object, we must consider the length contraction effect of ∇ itself. Promise Hamiltonian operator under moving conditions can be expressed as

$$\nabla = \nabla_s / \cos\beta = \frac{1}{\cos\beta_i}\frac{\partial}{\partial x}\vec{i} + \frac{1}{\cos\beta_j}\frac{\partial}{\partial y}\vec{j} + \frac{1}{\cos\beta_k}\frac{\partial}{\partial z}\vec{k}$$

Where $\cos\beta_i$, $\cos\beta_j$, $\cos\beta_k$ denote three components of length contraction ratio along three axis $\vec{i}$, $\vec{j}$, $\vec{k}$.

m_s denotes the rest mass of an object, by Theorem 2 and Theorem 4 we get $m = m_s/\cos\beta$, so Schrödinger equation which under moving conditions will be

$$i\hbar\frac{\partial}{\partial t}\psi(\vec{r},t) = -\frac{\hbar^2\cos\beta}{2m_s}\frac{\nabla_s^2\psi(\vec{r},t)}{\cos^2\beta} + V(\vec{r},t)\psi(\vec{r},t)$$

Finishing as

$$i\hbar\frac{\partial}{\partial t}\psi(\vec{r},t) = -\frac{\hbar^2}{2m_s\cos\beta}\nabla_s^2\psi(\vec{r},t) + V(\vec{r},t)\psi(\vec{r},t)$$

If analysis the wave equation by time of the information source itself, the time dilation effect of the operator $\partial/\partial t$ must be considered.

9 Electromagnetic Theory

9.1 Outer Product

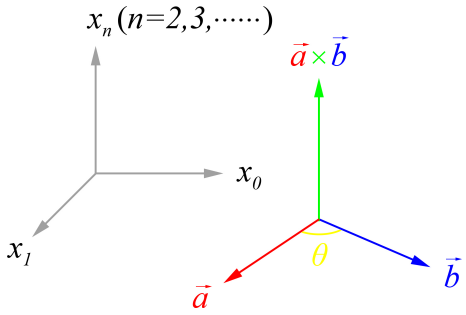

Figure 4: Outer product of vectors

As shown in Figure 4 . H denotes a infinite dimensional Hilbert space, x_0 , x_1 , x_n denote three unit basis vectors of a set of standard orthogonal basis of H , x_0 , x_1 , x_n denote three dimensions of H . $Span(x_0, x_1)$ denotes a two-dimensional space which being spanned by x_0 , x_1 , $Span(x_0, x_1, x_n)$ denotes a three-dimensional space which being spanned by x_0 , x_1 , x_n , $\vec{a}$ and $\vec{b}$ are two vectors in $Span(x_0, x_1)$, then $Span(x_0, x_1)$ is the two-dimensional complete subspace of $Span(x_0, x_1, x_n)$.

When $n=2$, the direction of $\vec{a}\times\vec{b}$ in $Span(x_0, x_1, x_2)$ is the positive direction of x_2 ;

When $n=3$, the direction of $\vec{a}\times\vec{b}$ in $Span(x_0, x_1, x_3)$ is the positive direction of x_3 ;

$\vdots$

So $\vec{a}\times\vec{b}$ is not a vector of H , only in three-dimensional space $\vec{a}\times\vec{b}$ can be a vector. Considering the relationship between $E\phi$, $E\xi$ and $E\vartheta$, $\vec{a}\times\vec{b}$ is the special vector for ϕ , only has three dimensions.

9.2 Complex Space

Any physical effect of vacuum does not come from the background $E\phi_i$, it comes from the vacuum quantum ${\phi_{ij}}^2$. Without loss of generality, $\{0,1,2,3,4,5\}$ denotes a dimension's number set of ξ_i , $\{0,1,2\}$ denotes a dimension's number set of ϕ_i , $\{1,2,3\}$ denotes a dimension's number set of vacuum quantum ${\phi_{ij}}^2$. $E{\phi_{ij}}^2$ denotes the background space of ${\phi_{ij}}^2$. In the view of ϕ_i , $E{\phi_{ij}}^2$ is either a complex space with dimension number set $\{1,2,3\}$ or a real space with dimension number set $\{1,2\}$.

Under this condition, in the view of ϕ_i , $No.3$ dimension of $E{\phi_{ij}}^2$ is an imaginary dimension, but in the view of ${\phi_{ij}}^2$, $No.0$ dimension of $E\phi_i$ is an imaginary dimension. Because ϕ_i can not identify the imaginary dimension, but $E{\phi_{ij}}^2$ has three dimensions, so ϕ_i will regard the vectors in $E{\phi_{ij}}^2$ are all complex vectors.

x_0 , x_1 , x_2 , $\cdots\cdots$ denotes a set of standard orthogonal basis of H, without loss of generality, let $E\xi_i = Span(x_0, x_1, x_2, x_3, x_4, x_5)$, $E\phi_i = Span(x_0, x_1, x_2)$, $E\phi_{ij} = Span(x_1, x_2, x_3)$.

$\vec{a}$ and $\vec{b}$ are two complex vectors in $Span(x_0, x_1, x_2)$, b denotes the norm of $\vec{b}$, θ denotes the angle between $\vec{a}$ and $\vec{b}$, i denotes imaginary unit. The right hand rule can be constructed by the following rules.

Rule 1 It can be considered that i is a rotation operator, $i\vec{x}$ denotes the operation let a real vector $\vec{x}$ rotate $\pi/2$ to i direction, $i^n\vec{x}$ denotes continuous to rotate $\vec{x}$ to i direction by n times $\pi/2$.

Rule 2 In the view angle of ϕ_i , i direction is the positive direction of x_3 in $E\phi_{ij}$, in the view angle of ϕ_{ij} , i direction is the positive direction of x_0 in $E\phi_i$.

Rule 3 In $E\phi_i$, $\forall\vec{a}$, $\exists\vec{b}$, makes $\vec{a}\times\vec{b} = -\vec{b}\times\vec{a} = i\vec{a}\cdot b\sin\theta$, the range of θ is $[0, 2\pi)$.

Known that $i\vec{a}\perp\vec{a}$, by Rule 2 , it must exit $\vec{b}$ in $E\phi_i$ cause the three complex vectors $i\vec{a}$, $\vec{a}$ and $\vec{b}$ meet the definition of outer product in $Span(ia, a, b)$.

9.3 Lemma

Lemma 1. *$\vec{A}$ denotes a three-dimensional complex vector field, S denotes a curved surface, $d\vec{B}$ denotes the differential area vector of S , the direction of $d\vec{B}$ points outside, B denotes the total area of S .*

If $\vec{A}\perp d\vec{B}$, there must exist

$$\vec{A}\cdot B = -i\int_S \vec{A}\times d\vec{B}$$

If $d\vec{B}$ is the differential area vector of a closed surface S , there must exist

$$\vec{A}\cdot B = -i\oint_S \vec{A}\times d\vec{B}$$

Proof. By Rule 3, there must exist $d\vec{B}$, when $\vec{A}\perp d\vec{B}$, we have

$$\vec{A}\times d\vec{B} = i\vec{A}\cdot dB\cdot\sin\frac{\pi}{2} = i\vec{A}\cdot dB \tag{9.1}$$

Known surface area

$$B = \int_S dB$$

Multiply $-i$ to both sides of Eq(9.1) and integral the curved surface, we get

$$\vec{A}\cdot B = -i\int_S \vec{A}\times d\vec{B}$$

If $d\vec{B}$ is the differential area vector of a closed surface S , then

$$\vec{A} \cdot B = -i \oint_S \vec{A} \times d\vec{B}$$

□

9.4 Gauss's Law of Electric Field

The definition of electric field is

$$\vec{E} \triangleq \frac{\alpha c}{e}(\nabla p + i \nabla \times \vec{p})$$

By Theorem 6 , p at position r which contributed by λ charge quantum will be

$$p = \lambda \frac{h}{r}$$

For the divergence of electric field

$$\nabla \cdot \vec{E} = \frac{\alpha c}{e}(\nabla^2 p + 0) = \alpha h c \frac{\lambda}{e} \nabla^2 \frac{1}{r} = 2\alpha h c \frac{\lambda}{e r^3}$$

Define electric constant as

$$\varepsilon_0 \triangleq \frac{e^2}{2\alpha h c}$$

Assuming any h corresponds to a charge quantum e , the total net charge will be λe , so

$$\varepsilon_0 \nabla \cdot \vec{E} = \frac{\lambda e}{r^3} = \rho$$

Where ρ is charge density. Then we get Gauss's law of electric field

$$\nabla \cdot \vec{E} = \frac{\rho}{\varepsilon_0}$$

9.5 Gauss's Law of Magnetic Field

The definition of magnetic field is

$$\vec{B} \triangleq \frac{\alpha}{e}(i \nabla p - \nabla \times \vec{p})$$

By Gauss's law of electric field we get

$$\nabla \cdot \vec{B} = \frac{i}{c} \nabla \cdot \vec{E} = \frac{i\rho}{\varepsilon_0 c} = ic\rho\mu_0$$

Where $\varepsilon_0 \mu_0 = 1/c^2$. Because $ic\rho\mu_0$ is an imaginary scalar, we can not identify it, so we will misunderstand that

$$\nabla \cdot \vec{B} = 0$$

Gauss's Law of Magnetic Field will be accurately expressed as

$$\nabla \cdot \vec{B} = ic\rho\mu_0$$

9.6 Faraday's Law of Induction

By the definitions of $\vec{B}$ and $\vec{E}$, $\triangle\vec{E} = -ic\triangle\vec{B}$. For the time derivative of $\vec{B}$

$$\frac{\partial\vec{B}}{\partial t} = \lim_{\triangle t\to 0}\frac{\triangle\vec{B}}{\triangle t} = \lim_{l\to 0}\frac{c\triangle\vec{B}}{l} = \lim_{V\to 0}\frac{c\triangle\vec{B}\cdot S}{V}$$

Where S is the area of arbitrary surface, $l = c\triangle t$, $V = l\cdot S$. By Lemma 1 , there must exist at least one suitable surface so that

$$\lim_{V\to 0}\frac{c\triangle\vec{B}\cdot S}{V} = \lim_{V\to 0}\frac{-i\oint_S c\triangle\vec{B}\times d\vec{S}}{V} = \lim_{V\to 0}\frac{\oint_S \triangle\vec{E}\times d\vec{S}}{V}$$

By the definition of curl

$$\nabla\times\triangle\vec{E} = -\lim_{V\to 0}\frac{\oint_S \triangle\vec{E}\times d\vec{S}}{V} = -\frac{\partial\vec{B}}{\partial t}$$

$\triangle\vec{E}$ denotes induced electric field, abbreviated as $\vec{E}$, then we get Faraday's law of induction

$$\nabla\times\vec{E} = -\frac{\partial\vec{B}}{\partial t}$$

9.7 Ampère-Maxwell's Law

$\triangle\vec{B}$ denotes induced magnetic field, for the time derivative of $\vec{E}$, by Faraday's law of induction

$$\frac{\partial\vec{E}}{\partial t} = -ic\frac{\partial\vec{B}}{\partial t} = ic\,\nabla\times\triangle\vec{E} = c^2\,\nabla\times\triangle\vec{B}$$

Let $\varepsilon_0\mu_0 = 1/c^2$, abbreviates $\triangle\vec{B}$ as $\vec{B}$, then

$$\nabla\times\vec{B} = \frac{1}{c^2}\frac{\partial\vec{E}}{\partial t} = \varepsilon_0\mu_0\frac{\partial\vec{E}}{\partial t} \tag{9.2}$$

Next to consider the static magnetic field, curl $\vec{B}$ directly

$$\nabla\times\vec{B} = \frac{\alpha}{e}\,\nabla\times(\,i\,\nabla p - \nabla\times\vec{p}\,) = -\frac{\alpha}{e}\,\nabla\times(\,\nabla\times\vec{p}\,) \tag{9.3}$$

Known that curl of curl can be expressed as

$$\nabla\times(\,\nabla\times\vec{p}\,) = \nabla(\,\nabla\cdot\vec{p}\,) - \nabla^2\vec{p}$$

By the definition of $\vec{p}$ we get

$$\nabla(\,\nabla\cdot\vec{p}\,) = 2\pi m_f\,\nabla(\,\nabla\cdot\vec{c}\,) = 0$$

By Theorem 6 we get

$$\vec{p} = i\vec{c}\cdot\frac{\lambda h}{rc}$$

So Eq(9.3) can be simplified as

$$\nabla\times\vec{B} = \frac{\alpha}{e}\,\nabla^2\,\vec{p} = \frac{\lambda\alpha h\vec{c}}{ec}\,\nabla^2\,\frac{1}{r} = \frac{2\lambda\alpha h\vec{c}}{ecr^3} \tag{9.4}$$

By the definition of ε_0 , $\alpha = e^2/2\varepsilon_0 hc$, then Eq(9.4) can be simplified as

$$\nabla\times\vec{B} = \frac{\lambda e\mu_0}{r^3}\vec{c}$$

Known the total number of charges can be expressed as $\sum q = \lambda e$, then

$$\nabla \times \vec{B} = \frac{\sum q}{r^3} \mu_0 \vec{c} \tag{9.5}$$

The definition of current density $\vec{J}$ is

$$\vec{J} \triangleq \frac{\sum q}{r^3} \vec{c}$$

After combined Eq(9.5) and Eq(9.2) , we get Ampère-Maxwell's law

$$\nabla \times \vec{B} = \mu_0 \vec{J} + \varepsilon_0 \mu_0 \frac{\partial \vec{E}}{\partial t}$$

10 Physical Constant

10.1 Fundamental Physical Constant

The following fundamental physical constants' value come from CODATA recommended values[1]
c denotes absolute light speed of ϕ

$$c = 2.99792458 \times 10^8 \, m/s$$

qt denotes minimum time interval which being identified by ϕ

$$qt = 5.39106 \times 10^{-44} \, s$$

h denotes elementary particles those being identified by ϕ

$$h = 6.62606957 \times 10^{-34} \, Js$$

e denotes contents of the inner or outer of γ_3 interface being understood by ϕ

$$e = 1.602176565 \times 10^{-19} \, C$$

α denotes the self mapping projection ratio of ϕ

$$\alpha = 7.2973525698 \times 10^{-3}$$

Three intrinsic angular frequencies of a hydrogen atom are fundamental physical constants, denoted from large to small by ω_1 , ω_2 , ω_3 , where ω_3 corresponds to the radius of positron. By Theorem 6, the mass of positron can be determined by ω_3, so we can directly regard the mass of positron m_e as a fundamental physical constant. The value of m_e is

$$m_e = 9.10938291 \times 10^{-31} \, kg$$

Because the mass of proton can be determined by ω_2, so we can directly regard the mass of proton m_p as a fundamental physical constant. The value of m_p is

$$m_p = 1.672621777 \times 10^{-27} kg$$

ω_1 is also a fundamental physical constant, but because of the lack of data, so we do not discuss it temporarily.

Because the temperature is also a subjective feeling of ϕ, so Boltzmann constant can be regarded as a fundamental physical constant to establish the relationship between the elementary particles and the temperature. Then there are total nine fundamental physical constants.

10.2 Derived Physical Constant

10.2.1 Electron Correlation Radius

Electron's classical radius which CODATA recommended is $2.8179403267 \times 10^{-15}\, m$. By Theorem 6 and the meaning of fine structure constant α , positron's mirror image radius will be

$$r_e = \frac{\alpha\hbar}{m_e c} = 2.8179403246 \times 10^{-15}\, m$$

Positron's charge radius is γ_3 , can be expressed as

$$\gamma_3 = \frac{\hbar}{m_e c} = 3.8615926771 \times 10^{-13}\, m$$

By Theorem 6 , the mirror image of positron's line speed $v = c/\alpha$ at classical radius r_e is about 137 times light speed c . Because electron is the reciprocal of symmetric mirror image of positron, so electron's classical radius is also r_e .

Bohr radius a_0 which CODATA recommended is $5.2917721092 \times 10^{-11}\, m$. a_0 is orbital radius of electron, that is the radius of positron's reciprocal symmetric mirror image, electron's line speed at the orbital radius a_0 is the projection of light speed c , shown as $v = \alpha c$. a_0 can be expressed as

$$a_0 = \frac{\hbar}{\alpha m_e c} = 5.2917721053 \times 10^{-11}\, m$$

10.2.2 Proton Correlation Radius

Proton's charge radius which CODATA recommended is $0.8775 \times 10^{-15}\, m$, the measured value in 2013[2] is $0.84087 \times 10^{-15}\, m$. By Theorem 6 , proton's charge radius will be

$$\gamma_2 = \frac{4\hbar}{m_p c} = 0.84123564148 \times 10^{-15}\, m$$

Proton also has classical radius, denoted by r_p . Similar to electron's classical radius, proton's classical radius will be

$$r_p = \gamma_2 \cdot \alpha = 6.1387930702 \times 10^{-18}\, m$$

Proton also has orbital radius, denoted by b_0 . By Theorem 6 , proton's orbital radius will be

$$b_0 = \gamma_2/\alpha = 1.1527956659 \times 10^{-13}\, m$$

Electron's rest mass m_e and proton's rest mass m_p are all the performance mass at the corresponding logical interfaces of ϕ , the line speed of proton at the orbital radius b_0 is the projection of light speed c , the value is equal to electron's intrinsic line speed, shown as $v = \alpha c$.

10.2.3 Rest Mass Quantum

Rest mass quantum (Planck mass) which CODATA recommended is $2.17651 \times 10^{-8}\, kg$. By Eq(5.1) , the theoretical value of rest mass quantum will be

$$\dot{m}_s = \frac{\hbar}{cqs} = 2.1765094236 \times 10^{-8}\, kg$$

10.2.4 Gravitational Constant

Gravitational constant G which CODATA recommended is $6.67384 \times 10^{-11}\, m^3/kg \cdot s^2$. By the definition of G we get

$$G \triangleq \frac{c^2 qs}{\dot{m}_s} = 6.6738389505 \times 10^{-11}\, m^3/kg \cdot s^2$$

10.2.5 Avogadro's Constant

Avogadro's constant N_A which CODATA recommended is $6.02214129 \times 10^{23}\, mol^{-1}$.

By Eq(3.3) , the relationship between φ_e and φ_3 will be

$$\frac{\varphi_e}{\varphi_3} = \frac{1}{1+\alpha}$$

r_p denotes the radius of the proton's information distribution area. By Postulate 8 , φ_3 pass through positron and electron repeatedly, the relationship between hydrogen atom's rest intrinsic mass m_s and proton's rest mass m_p will be

$$\frac{\varphi_e}{\varphi_3} = \frac{1}{1+\alpha} = \frac{\pi {r_p}^2 m_s}{\pi {r_p}^2 m_p} = \frac{m_s}{m_p}$$

Known that proton's intrinsic line speed $v = \alpha c$, assuming ϕ will believe the micro moving mass of a proton is the macro rest mass of a hydrogen atom , by Theorem 4 , the rest mass of a hydrogen atom will be

$$m = \frac{m_s}{\cos\beta} = \frac{m_s}{\sqrt{1-\frac{\alpha^2 c^2}{c^2}}} = \frac{m_s}{\sqrt{1-\alpha^2}} = \frac{m_p}{(1+\alpha)\sqrt{1-\alpha^2}}$$

The definition of Molar mass constant is $M_u \triangleq 0.001\, kg/mol$, then the theoretical value of Avogadro's constant N_A will be

$$N_A = \frac{M_u}{m} = \frac{0.001(1+\alpha)\sqrt{1-\alpha^2}}{m_p} = 6.0221058107 \times 10^{23}\, mol^{-1}$$

11 Epilogue

Because both in philosophy and in physics, substance is either the cycle defined invalid concept, or the undefined vague concept, unable to meet the law of identity in logic, so we can not establish any self-consistent theoretical system based on substance. But if we establish a theoretical system based on the spirit, we will not only find out a logical theoretical system to explain the natural phenomena accurately, but also explain many problems those unresolved by traditional theories, we can even provide a reasonable answer about world origin in philosophical sense and give substance a strict definition.

Because based on the axiom system, the theoretical results can meet the observation results and experimental data accurately, the accuracy does not lose any of other physical theories include quantum field theory, so from the perspective of scientific evidence, if someone wants to disprove this theory, hope is from scientific or logic aspect but not from ideological reasons to deny it.

References

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