Errors in Nobel Prize for Physics (7)

——Improper Schrodinger Equation and Dirac Equation

Fu Yuhua

(CNOOC Research Institute, E-mail:fuyh1945@sina.com)

Abstract: One of the reasons for 1933 Nobel Prize for physics is "for the discovery of new productive forms of atomic theory" (namely Schrodinger equation and Dirac equation). While, this paper points out that Schrodinger equation and Dirac equation are improper. According to Neutrosophy, Schrodinger equation and Dirac equation have three situations of truth, falsehood and indeterminacy respectively. Three reasons lead to Schrodinger equation and Dirac equation are improper: firstly, they are not derived by the principle of conservation of energy; secondly, the random (stochastic) concept could lead to absurd results; thirdly, they cannot solve many problems such as gravitation. Applying "partial and temporary unified theory of natural science so far" including all the equations of natural science so far (in which, the theory of everything to express all of natural laws, described by Hawking that a single equation could be written on a T-shirt, is partially and temporarily realized in the form of "partial and temporary unified variational principle of natural science so far"), this paper presents "partial and temporary unified theory of quantum mechanics so far", this unified theory can be used to make Schrodinger equation and Dirac equation tend to be proper (making Schrodinger equation and Dirac equation are restricted (or constrained) by principle of conservation of energy, and thus they can satisfy the principle of conservation of energy; also making they are restricted (or constrained) by a certain gravitational theory, and establish "partial and temporary unified theory of quantum-gravitation so far").

Key words: Schrodinger equation, Dirac equation, improper, principle of conservation of energy, partial and temporary unified theory of natural science so far, partial and temporary unified theory of quantum mechanics so far, partial and temporary unified theory of quantum-gravitation so far

Introduction

In quantum mechanics, Schrodinger equation and Dirac equation are two very important basic equations. One of the reasons for 1933 Nobel Prize for physics is "for the discovery of new productive forms of atomic theory" (namely Schrodinger equation and Dirac equation). While, this paper points out that Schrodinger equation and Dirac equation are improper.

According to Neutrosophy (more information about Neutrosophy may be found in references [1, 2]), all propositions (including Schrodinger equation and Dirac equation) have three situations of truth, falsehood and indeterminacy respectively. In which the situations of falsehood and indeterminacy lead to that Schrodinger equation and Dirac equation are improper.

Applying "partial and temporary unified theory of natural science so far" including all the equations of natural science so far (in which, the theory of everything to express all of natural laws, described by Hawking that a single equation could be written on a T-shirt, is

partially and temporarily realized in the form of "partial and temporary unified variational principle of natural science so far"), we can make Schrodinger equation and Dirac equation tend to be proper.

1 Schrodinger equation and Dirac equation are improper

Firstly, Schrodinger equation and Dirac equation are not derived by the principle of conservation of energy.

As well-known, Schrodinger Equation is actually a basic assumption of quantum mechanics, people can only rely on experiments to test its correctness. While in physics the principles, laws, equations and the like that do not consider the principle of conservation of energy will be invalid in some cases.

In some aspect, the function of Schrodinger Equation is equivalent to Newton's second law. However in reference [3], through the example of free falling body, we derive the original Newton's second law by using the law of conservation of energy, and prove that there is not the contradiction between the original law of gravity and the law of conservation of energy; and through the example of a small ball rolls along the inclined plane (belonging to the problem cannot be solved by general relativity that a body is forced to move in flat space), derive improved Newton's second law and improved law of gravity by using law of conservation of energy.

How to derive Schrodinger Equation with the law of conservation of energy, is a topic for further research.

For the reason that the Dirac equation is complying with the principles of special relativity and quantum mechanics simultaneously, and it is the Lorentz covariant form of Schrodinger Equation; therefore, the Dirac equation is not derived by the principle of conservation of energy also.

In addition, we already point out the shortcomings of special relativity in reference [4], so the Dirac equation inevitably has the defects caused by special relativity.

Secondly, the random (stochastic) concept could lead to absurd results.

The random (stochastic) results given by Schrodinger equation and Dirac equation have been opposed and criticized by many scholars. Here we present some absurd results caused by the random (stochastic) concept of Schrodinger equation and Dirac equation.

According to the Schrodinger equation and Dirac equation, when the particle is in a certain state, its mechanical quantities (such as coordinates, momentum, angular momentum, energy, etc) generally do not have a definite value, and have a series of possible values, each possible value is appeared with a certain probability. In accordance with this random (stochastic) concept, the mass of microscopic particle such as electron, proton and neutron, should also generally do not have a definite value! And the number of electron, proton and neutron contained by the atom of each element should also generally do not have a definite value! Particularly, the ratio of proton mass to electron mass should also generally do not have a definite value (instead of 1836.1527)!

Thirdly, they cannot solve many problems such as gravitation.

Not only Schrodinger equation and Dirac equation cannot be used to solve the gravitational problem, but also they cannot be used to solve many problems of

microscopic particles. For example, they cannot give that the ratio of proton mass to electron mass is equal to 1836.1527. Another example is that they cannot give the shielding distance in plasma problem, the Debye distance formula must be applied.

2 Making Schrodinger equation and Dirac equation tend to be proper
2.1 Partial and temporary unified variational principle of natural science so far

In reference [2], for any field, least square method can be used to establish this field's "partial and temporary unified theory so far" (the corresponding expression is "partial and temporary unified variational principle so far").

Supposing that for a certain domain Ω, we already establish the following general equations

$$F_i = 0 \qquad (i = 1,2 \to n) \qquad (1)$$

On boundary V, the boundary conditions are as follows

$$B_j = 0 \qquad (j = 1,2 \to m) \qquad (2)$$

Applying least square method, for this field and the domains and boundary conditions the "partial and temporary unified theory so far" can be expressed in the following form of "partial and temporary unified variational principle so far"

$$\Pi = \sum_1^n W_i \int_\Omega F_i^2 d\Omega + \sum_1^m W_j' \int_V B_j^2 dV = \min{}_0 \qquad (3)$$

where: $\min{}_0$ was introduced in reference [5], indicating the minimum and its value

should be equal to zero. W_i and W_j' are suitable positive weighted constants; for the

simplest cases, all of these weighted constants can be taken as 1. If only a certain equation is considered, we can only make its corresponding weighted constant is equal to 1 and the other weighted constants are all equal to 0.

By using this method, we already established the "partial and temporary unified water gravity wave theory so far" and the corresponding "partial and temporary unified water gravity wave variational principle so far", in reference [6]; and established the "partial and temporary unified theory of fluid mechanics so far" and the corresponding "partial and temporary unified variational principle of fluid mechanics so far" in reference [7].

Some scholars may said, this is simply the application of least square method, our answer is that: the simplest way may be the most effective way.

It should be noted that, in past time, due to we cannot realize that the strict "unified theory" cannot be existed, therefore in references [6] and [7], the wrong ideas that "unified water gravity wave theory", "unified water gravity wave variational principle", "unified theory of fluid mechanics" and "unified variational principle of fluid mechanics" were appeared. Now we correct these mistakes in this paper.

It should also be noted that, Eq.(2) can be included in Eq.(1), therefore we will only discuss Eq.(1), rather than discuss Eq.(2).

In reference [2], for unified dealing with the problems of natural science, applying least square method, "partial and temporary unified theory of natural science so far" can be expressed in the following form of "partial and temporary unified variational principle of natural science so far"

$$\Pi_{\text{NATURE}} = \sum_{1}^{n} W_i \int_{\Omega_i} F_i^2 d\Omega_i + \sum_{1}^{m} W_j' S_j^2 = \min{}_0 \qquad (4)$$

where: the subscript NATURE denotes that the suitable scope is all of the problems of natural science, all of the equations $F_i = 0$ denote so far discovered (derived) all of the equations related to natural science, all of the equations $S_i = 0$ denote so far discovered (derived) all of the solitary equations related to natural science (for example, the coefficient in the Coulomb's law can be written as the following solitary equation: $S_1 = 0$, where, $S_1 = k - 9.0 \times 10^9 \text{N·m}^2/\text{C}^2$), and W_i and W_j' are suitable positive weighted constants.

In this way, the theory of everything to express all of natural laws, described by Hawking that a single equation could be written on a T-shirt, is partially and temporarily realized in the form of "partial and temporary unified variational principle of natural science so far".

2.2 Partial and temporary unified theory of quantum mechanics so far

Now we apply the unified variational principle to make Schrodinger equation and Dirac equation tend to be proper.

The Schrodinger equation can be written as follows

$$H\psi = i\hbar \frac{\partial}{\partial t}\psi \qquad (5)$$

where, H is the Hamiltonian operator, ψ is the wave function, and $\hbar$ is the reduced Planck constant.

The Dirac equation can be written as follows

$$\frac{1}{i}\gamma^\mu \partial_\mu \psi + m\psi = 0 \qquad (6)$$

Referring to "partial and temporary unified variational principle of natural science so far" (namely Eq.(4)), applying least square method, "partial and temporary unified theory of quantum mechanics so far" can be expressed in the following form of "partial and temporary unified variational principle of quantum mechanics so far"

$$\Pi_{\text{QM}} = \sum_{1}^{n} W_i \int_{\Omega_i} F_i^2 d\Omega_i + \sum_{1}^{m} W_j' S_j^2 + \Pi_{\text{OTHER}} = \min{}_0 \qquad (7)$$

where: the subscript QM denotes that the suitable scope is all of the problems of

quantum mechanics, all of the equations $F_i = 0$ denote so far discovered (derived) all of the equations related to quantum mechanics, all of the equations $S_i = 0$ denote so far discovered (derived) all of the solitary equations related to quantum mechanics (for example, the ratio of proton mass to electron mass can be written as the following solitary equation: $S_1 = 0$, where, $S_1 = m_p / m_e - 1836.1527$), W_i and W_j' are suitable positive weighted constants, and Π_{OTHER} denote all the functionals established by the principles, laws, formulas and the like that are not included in quantum mechanics (they can be included in the fields of mathematics, chemistry and the like, and we will establish this kind of functionals with the principle of conservation of energy and some gravitational theories).

For example, according to Schrodinger equation, it can give

$$F_1 = H\psi - i\hbar \frac{\partial}{\partial t}\psi \qquad (8)$$

According to Dirac equation, it can give

$$F_2 = \frac{1}{i}\gamma^\mu \partial_\mu \psi + m\psi \qquad (9)$$

As substituting this form of Dirac equation into Eq.(7), we should refer to the manner to deal with Maxwell's equations for establishing "partial and temporary unified electromagnetic theory so far" in reference [2].

It should be noted that, as dealing with the equations related to quantum mechanics in Eq.(7), If only Schrodinger equation is applied, we can only make its corresponding weighted constant $W_1 = 1$, and the other weighted constants $W_i = 0$; and if only Dirac equation is applied, we can only make its corresponding weighted constant $W_2 = 1$, and the other weighted constants $W_i = 0$.

Now we establish functional Π_{OTHER} with principle of conservation of energy.

The general form of principle of conservation of energy is as follows

$$E(t) = E(0) = const$$

Or

$$1 - \frac{E(t)}{E(0)} = 0 \qquad (10)$$

According to above expression, we can establish the following functional

$$\Pi_{\text{OTHER}} = w \int_{t_1}^{t_2} (1 - \frac{E(t)}{E(0)})^2 \, dt \qquad\qquad （11）$$

where, w is a positive weighted constant.

Or another form of the functional

$$\Pi_{\text{OTHER}} = w(1 - \frac{E(t)}{E(0)})^2 \qquad\qquad （12）$$

Substituting Eq.(11) or Eq.(12) into Eq.(7), we will make Schrodinger equation and Dirac equation (and other equations) are restricted (or constrained) by principle of conservation of energy, and thus they can satisfy the principle of conservation of energy.

2.3 Partial and temporary unified theory of quantum-gravitation so far

As establishing "partial and temporary unified theory of quantum-gravitation so far", firstly we should establish "partial and temporary unified theory of quantum mechanics so far" (namely Eq.(7)) and "partial and temporary unified gravitational theory so far" respectively, then these two unified theories can be combined together (it is equivalent that one unified theory is restricted (or constrained) by another unified theory).

In reference [2], we already point out that, applying least square method, "partial and temporary unified gravitational theory so far" can be expressed in the following form of "partial and temporary unified gravitational variational principle so far".

$$\Pi_{\text{GRAVITY}} = \sum_{1}^{n} W_i \int_{\Omega_i} F_i^2 \, d\Omega_i + \sum_{1}^{m} W_j' S_j^2 = \min{}_0 \qquad （13）$$

where: the subscript GRAVITY denotes that the suitable scope is the gravity, all of the equations $F_i = 0$ denote so far discovered (derived) all of the equations related to gravity, all of the equations $S_i = 0$ denote so far discovered (derived) all of the solitary equations related to gravity, and W_i and W_j' are suitable positive weighted constants.

According to Eq.(7) and Eq.(13), and they should be restricted (or constrained) by principle of conservation of energy, therefore "partial and temporary unified theory of quantum-gravitation so far" can be expressed in the following form of "partial and temporary unified variational principle of quantum-gravitation so far".

$$\Pi_{\text{QM-GRAVITY}} = \Pi_{\text{QM}} + \Pi_{\text{GRAVITY}} + \Pi_{\text{OTHER}} = \min{}_0 \qquad （14）$$

where: according to Eq.(11), $\Pi_{\text{OTHER}} = w \int_{t_1}^{t_2} (1 - \frac{E(t)}{E(0)})^2 \, dt$, the reason for adding this functional is also to consider that they should be restricted (or constrained) by principle of conservation of energy.

Now, according to Schroedinger equation and several theories of gravitation, we will present "the simplest partial and temporary unified theory of quantum-gravitation so far".

Supposing thst a certain theory of gravitation can be written as follows

$$F_{\mathrm{GR}} = 0 \qquad\qquad (15)$$

According to Eq.(8), Eq.(15), ang Eq.(11), we can establish the following general form of "the simplest partial and temporary unified theory of quantum-gravitation so far".

$$\Pi_{\mathrm{Q\text{-}G}} = W_1 \int_{\Omega_1} F_1^2 d\Omega_1 + W_2 \int_{\Omega_2} F_{\mathrm{GR}}^2 d\Omega_2 + \Pi_{\mathrm{OTHER}} = \min_0 \quad (16)$$

where, according to Schroedinger equation Eq.(8): $F_1 = H\psi - i\hbar\dfrac{\partial}{\partial t}\psi$, according to

Eq.(11): $\Pi_{\mathrm{OTHER}} = w \displaystyle\int_{t_1}^{t_2} (1 - \dfrac{E(t)}{E(0)})^2 dt$, and the expression of F_{GR} should be determined by

the applied theory of gravitation.

Now we will discuss several concrete theories of gravitation.

Supposing that Newton's theory of gravity is applied, and it can be written as follows

$$F = -\frac{GMm}{r^2}$$

It gives

$$F_{\mathrm{GR}} = F + \frac{GMm}{r^2} \qquad\qquad (17)$$

Supposing that the improved Newton's formula of universal gravitation presented in reference [2] is applied (this formula can give the same results as given by general relativity for the problem of planetary advance of perihelion and the problem of gravitational defection of a photon orbit around the Sun), and it can be written as follows

$$F = -\frac{GMm}{r^2} - \frac{3G^2 M^2 mp}{c^2 r^4}$$

It gives

$$F_{\mathrm{GR}} = F + \frac{GMm}{r^2} + \frac{3G^2 M^2 mp}{c^2 r^4} \qquad\qquad (18)$$

Supposing that the more accurate gravitational formula presented in reference [2, 3] is applied (as solving the problem of gravitational defection of a photon orbit around the Sun with this formula, the result of deflection angle is exactly the same as given by precise astronomical observation, while the results given by general relativity and the improved Newton's formula of universal gravitation have still slight deviations with the precise astronomical observation), and it can be written as follows

$$F = -\frac{GMm}{r^2}(1 + \frac{3GMp}{c^2 r^2} + \frac{wG^2 M^2 p^2}{c^4 r^4})$$

It gives

$$F_{\mathrm{GR}} = F + \frac{GMm}{r^2}(1 + \frac{3GMp}{c^2 r^2} + \frac{wG^2 M^2 p^2}{c^4 r^4}) \qquad\qquad (19)$$

Supposing that Einstein's gravitational field equations is applied, and it can be written as follows

$$R_{ab} - \frac{1}{2}R g_{ab} = \kappa T_{ab}$$

It gives

$$F_{GR} = R_{ab} - \frac{1}{2}R g_{ab} - \kappa T_{ab} \qquad (20)$$

If other theory of gravitation is applied, then other form of F_{GR} can be given.

3 Conclusions

Establishing "partial and temporary unified theory of quantum mechanics so far" and "partial and temporary unified theory of quantum-gravitation so far", can make Schrodinger equation and Dirac equation tend to be proper. Further topic of research should be the application of these partial and temporary unified theories so far.

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