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Ground State Solution of Dongfang Modified Dirac Equation

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In order to deal with the mathematical contradiction that the Dirac wave function does not meet the definite solution condition, an effective and reasonable solution is to replace the traditional rough boundary condition with the precise boundary condition in which the nuclear radius is written. The exact solution of the hydrogen-like atom self consistent Dirac equation satisfying the exact boundary conditions has subversive physical significance. It also shows a new mathematical point of view, that is, the boundary parameters become one of the eigensolutions of the equation, and the solutions of the equation may be completely different due to the slight difference of the boundary conditions. Dongfang modified Dirac hydrogen equation replaces the angular quantum number defined by the illogical Dirac electron theory with the intrinsic angular quantum number determined by the exact solution of the equation. Here I further study of the ground state solution of the modified Dirac equation which satisfies the exact boundary conditions. The results show that the ground state of the modified Dirac equation for hydrogen-like atoms is a triple degenerate state with three intrinsic angular momentum and three intrinsic wave functions; the intrinsic angular momentum of the ground state is neither the angular momentum constructed by the anti-logic of Dirac electron theory nor the angular momentum of Schrödinger equation. The two components of one of the intrinsic wave functions of the ground state are linearly related. The existence of the exact solution of the intrinsic ground state and the essential difference between the intrinsic ground state energy level and the Dirac ground state energy level further illustrate that the angular momentum constructed by the so-called Dirac algebra is not a corollary of scientific logic, and the Dirac equation cannot explain the fine structure of hydrogen-like atoms. It is only one of the most puzzling representatives of modern physics as the basic equation of quantum field theory. However, because Dirac equation contains rich mathematical problems and unique processing technology, it will help the development of mathematical theory to incorporate it into mathematics textbooks as a new mathematical model.

Keywords: Dongfang unitary principle; Modified Dirac equation; Quantum radius of atomic nucleus; Intrinsic angular quantum number.

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1 Introduction

Physics uses mathematical language to describe natural phenomena and reveal the laws of motion of various substances in nature. Physics cannot be separated from equations. The equations of physics must always be the inference of the basic laws of physics and cannot be constructed at will; the special solution of the physical equation must conform to the physical meaning. Mathematical equations can be constructed arbitrarily. Mathematical theory pays attention to the integrity of the general solution of mathematical equations, and the meaning of the solution is often ignored. There are two kinds of phenomena in modern physics. One is incorrect equations or incorrect solutions of equations, which are used to explain experimental phenomena that cannot be explained by classical physics[1-17], and then are generally accepted. The other is the falsification, simulation and even computer-generated data used to verify the inference of incorrect equations, and then received high praise[18-26].

It is the mainstream of modern physics to build physical theory according to expectations, and it is also the most fundamental reason that theoretical physics is in trouble and puzzles physics readers. The simplest example is that there has never been a meson in the atomic nucleus, but the meson theory of Yukawa's nuclear force, which completely distorts the mathematical rules and is filled with uncorrectable calculation errors[27, 28], is recognized as a major breakthrough in physical theory. In recent 100 years, it has been widely publicized as an important theory to describe the interaction between nucleons, and it is not allowed to question and test, but continues to develop. The formal solution of the Dirac equation of hydrogen like atom that does not meet the conditions of a definite solution is much more complex.

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Dirac energy level formula implies imaginary energy, and the divergence of Dirac wave function at the coordinate origin means the collapse of the universe, which is completely inconsistent with objective facts. Therefore, the use of Dirac energy level formula to explain the fine spectral structure of the hydrogen like atom is purely a matter of grafting. It is thought-provoking that this kind of carefully constructed abnormal logic has its own charm because of the novelty of the floating light, which has been continuously promoted and developed as one of the outstanding achievements in physics.

There is a famous saying that facts speak louder than words. Perhaps this is the fundamental reason why experimental data claiming major discoveries in modern physics are often unrepeatable. Systematic error correction often leads to the distortion of experimental data, which later developed into a large number of tampering, and even replaced by simulation experimental data and even fabricated data. Readers usually cannot question experimental reports that claim significant observational data. However, *There is a definite transformation relationship between different metrics describing the natural law, and the natural law itself does not change due to the selection of different metrics. When the mathematical expression of natural laws under different metrics is transformed into one metric, the result must be the same as the inherent form under this metric, 1=1, meaning the transformation is unitary,Chen:2011,Dongfang:2021.* In short, *the result of the transformation of the mathematical form of the natural law in different metrics to the same metric is unique.* The discovery of this basic principle, called the Dongfang unitary principle, which is generally applicable to testing the logic of the theory and the reliability of experimental reports, makes things very simple. For example, the conclusion of the unitary principle test of the reliability of LIGO's gw150914 signal is irreversible: even if the original spiral binary star merger event that assumes that LIGO's predetermined signal is not reproducible really exists, the detailed data of the gw150914 signal released by LIGO just proves that the described binary stars failed to achieve the final merger because of the loss of key Peugeot spikes; Because spiral binaries have not been successfully merged, if they exist, they will continue to radiate equal frequency signals for a long time; However, LIGO cannot receive this kind of equal frequency late signal that can be repeatedly observed, so it violates the unitary principle; It can be seen that the so-called spiral binary gravitational wave experiment report is obviously an elaborate fairy tale. It can be predicted that those who adhere to scientific truth and those who safeguard academic lies will form two camps in the field of theoretical physics in the next 100 years. Although the unique advantages of the degree system ensure that the team of the latter is very large, the truth will one day awaken the conscience of young scholars.

The basic assumptions of modern physics usually do not conform to the unitary principle and are obviously unreliable. A large number of completely distorted conclusions in modern physics were covered up and whitewashed by false calculations and fabricated experimental reports. I have proved that the so-called Einstein principle of invariance of the speed of light is purely a mathematical magic definition[30], listed examples of quantum number morbid equation that prove that quantum mechanics destroys the law of conservation of energy, proposed the angular motion law[31], explained the limitations of the quantum mechanics operator principle through the angular motion law operator evolution equation group[32], and analyzed the macroscopic quantized exact equation contained in the GW150914 signal of LIGO[33-35]. Using the unitary principle to systematically test the development theory of relativity and quantum mechanics, I ended Yukawa's nuclear meson theory[36, 37], the Klein-Gordon equation of Coulomb field[38], the teratogenic simplified Dirac equation[39], the isomeric second-order Dirac equation[40], the expected solution of the real second-order Dirac equation[41], and then gave the challenging solution of the hydrogen-like atom Dirac equation[42], and negated the angular momentum value defined by the illogical Dirac electron theory and gives the neutron state solution of the modified Dirac hydrogen equation[43]. No matter how slandered, strangled or pretended to be ignored by mainstream physicists and mainstream scientific media, any research achievements devoted to exposing false calculations and false experimental reports in modern physics and correcting correctable calculations[44-46] will promote the profound revolution of theoretical physics calculation and experimental test, the false calculation and its conclusion will eventually be replaced by the true calculation and conclusion, and the fake observation data experimental report will eventually be completely abandoned. This is the great motive power for someone to always adhere to the truth.

The interpretation of the Dirac equation to the quantum mechanical wave equation of the fine structure of the hydrogen-like atom spectrum is flashy. However, if we take the Dirac equation as a pure mathematical problem and try to find its reasonable part to the maximum, we can find interesting mathematical problems that have not been found in the past. The main conclusions are that, in order to ensure that the Dirac equation and its solution are mathematically self-consistent, it is necessary to replace the rough boundary condition without considering the size of the atomic nucleus with the exact boundary condition written in the size of the atomic nucleus, and the angular quantum number must be taken as the intrinsic parameter of the Dirac equation, which is determined by the exact solution of the equation rather than constructed by the Dirac algebra theory. In this way, the neutron state solution obtained by dealing with the Dirac equation of the hydrogen-like atom is the true intrinsic solution. This is a special case of the challenge

solution of the Dirac equation. The accuracy of the energy level formula of the challenge solution is equivalent to the accuracy of the Bohr energy level, without regard to the fine structure of the atomic spectrum. So what are the intrinsic ground state solution and intrinsic excited state solution of the Dirac equation? This paper discusses the intrinsic ground state solution of the Dongfang modified Dirac equation for hydrogen-like atoms that satisfies the exact boundary conditions and determines the intrinsic ground state angular quantum number of the Dirac equation. The result again proves that the angular quantum number constructed by Dirac algebra theory is invalid.

2 Conclusions and comments

It is generally believed that the Dirac equation successfully integrates quantum mechanics and special relativity, opens up the field of relativistic quantum mechanics, predicts the existence of antimatter, explains the fine structure of hydrogen atom spectrum, promotes the development of electromagnetic theory to quantum electrodynamics, lays the foundation of quantum field theory, and promotes the development of particle physics and high-energy physics. The Dirac equation seems to have been one of the most important basic equations in physics[47-55]. However, the Dirac wave function and the Dirac energy level formula are one of the formal solutions of the Dirac equation of hydrogen like atoms that do not meet the predetermined rough boundary conditions, hiding logical disasters such as the collapse of the universe and virtual energy that do not conform to the facts. These problems make Dirac electron theory one of the typical representatives of the unprecedented success of modern physics in explaining experimental phenomena through the non-real solutions of equations.

There are two solutions to solve the difficulties caused by the angular quantum number constructed by Dirac electron theory, such as the traditional solution of Dirac equation does not meet the conditions of definite solution and virtual energy. One is tantamount to rebuild the wave equation, and the other is to reprocess the Dirac equation. At present, I choose the latter scheme, hoping to find the most reasonable logic for the Dirac equation.. Considering the size of the atomic nucleus, any physical quantity describing the hydrogen like atomic system takes the space outside the atomic nucleus as the domain of definition, writes the radius of the atomic nucleus into the boundary conditions, replaces the traditional rough boundary conditions that do not consider the size of the atomic nucleus with the precise boundary conditions, and re solves the Dirac equation of the hydrogen like atom. We obtain the quantized intrinsic energy formula with an accuracy equivalent to the Bohr energy level, which is the challenge solution of the Dirac equation.

Relativistic quantum mechanics only pays attention to the acquisition of quantized energy formula but has always ignored the specific form of wave function. When we attempt to obtain the wave function of the energy state corresponding to the higher principal quantum number, the challenge solution of the Dirac equation of the hydrogen like atom satisfying the exact boundary conditions presents the existence of the solution. We need to take the angular quantum number as one of the eigensolutions of the equation, or the solution of the equation does not exist. Therefore, I introduce the undetermined angular quantum number $\mathbb{C}$ to replace the angular quantum number $\kappa = \pm 1, \pm 2, \pm 3, \cdots$ defined by Dirac electron theory, thereby modifying the Dirac equation of hydrogen like atoms. The modified Dirac equation has neutron state solution. The neutron state solution gives the minimum nontrivial angular quantum number of the hydrogen like atom, which is not the result of quantum mechanics in the past. At the same time, it also gives the radius of the hydrogen like atom. For hydrogen atoms, the neutron state solution of the modified Dirac equation seems to describe the structure of neutrons. In this paper, we further study the ground state solution of the modified Dirac equation for hydrogen like atoms. It is clear that the ground state has three intrinsic angular quantum numbers and the ground state energy is a triple degenerate state. The results of the neutron state solution and the intrinsic ground state solution of the modified Dirac equation show that the undetermined angular quantum number is complex, and we don't know what the value of the undetermined angular quantum number of various excited states is. However, the existing conclusions have once again proved that the Dirac equation cannot explain the fine structure of hydrogen like atom spectrum. The Dirac electron theory breaks the rule that angular quantum number of quantum mechanics is one of the eigensolutions of the equation, and it is unreasonable to artificially construct the angular quantum number. The three intrinsic angular quantum numbers of the ground state are strictly mathematical conclusions. We need further study to reveal its physical significance.

Introducing the intrinsic angular quantum number to modify the Dirac equation is a but not the only way to deal with the hidden logical contradiction of the equation. Can we modify Dirac equation according to the construction of the Dirac equation? Using the Dongfang unitary principle, we can systematically prove that the theory of relativity is not tenable. Obviously, only introducing the undetermined intrinsic angular quantum number to correct the Dirac equation based on the relativistic momentum and energy relationship is not the ultimate answer to improve the quantum theory. But from a mathematical point of view, relativity only increases the speed of light factor on the basis of Newtonian mechanics, which raises a question: does the non-relativistic theory of high-speed motion exist? Is it pos-

sible for this problem to lead to the discovery of the wave equation similar to the Dirac equation? Of course, there will always be great resistance to subversive revision of famous theories. Then within the framework of relativity, what kind of anti mathematical problems are hidden in the algebraic theory of defining angular quantum numbers in Dirac electron theory, and how Dirac electron theory goes beyond mathematical rules to transform the equation of four component wave function into two-component wave function equation, which need further research. The discovery and solution of every relevant new problem may lead to the revision of the Dirac equation again, and even lead to completely different conclusions. Therefore, it is necessary to test the construction logic of the Dirac equation for the two-component wave function.

The neutron state solution and the intrinsic ground state solution of the Dongfang modified Dirac hydrogen equation exceed the customary concepts of quantum mechanics. This pioneering new conclusion indicates that it seems that every additional quantum number to solve the intrinsic solution of the modified Dirac equation or the special solution of the similar equation that satisfies the exact boundary will become an inexhaustible source of writing for theoretical physics or mathematics researchers. However, with each additional quantum number, the difficulty of accurate solution will increase. The contribution of this kind of work on mathematics may be greater than that of physics.

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