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Mathematical Modeling of Fine Superstring Structure of Hydrogen Atoms

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Abstract: To address the phenomenon of electron clouds in hydrogen atoms and other extra-nuclear electron clouds, a high-dimensional confinement and asymptotic freedom theory of electron pairs is proposed. Furthermore, to resolve the non-contradictory interaction between electrons and protons, a string reaction theory is introduced. The model presented explains not only why electrons do not combine with protons to lose their electron cloud motion properties but also why multiple extra-nuclear electrons do not undergo classical collisions. Additionally, it provides an explanation for the string reaction nature of the photoelectric effect. The model presented herein is supported by previous laboratory results. The paper presents a model of string reaction between electrons and protons, which explains the trajectory of electrons in hydrogen atoms and why electrons can continuously orbit around protons. This innovative model describes that, under certain constraints, electrons can traverse through protons. After traversal, the electrons retain their original physical properties but undergo slight changes in velocity, while the physical properties of the protons remain unchanged. This model explains using string theory, transforming the purely mathematical nature of string theory into an interpretation of the physical phenomena. This demonstrates that string theory is a practical tool that can be applied to physics.

Keywords: Hydrogen atom; Superstring; High dimensional space; Electron wave particle duality

0. Introduction

The hydrogen atom is electrically neutral, consisting of a positively charged proton and a negatively charged electron. Traditional theories explain that the electron orbits the nucleus due to the binding force of Coulomb’s law. However, these theories fail to elucidate why the electron does not continuously approach and merge with the proton, nor can they account for the probabilistic nature of the electron’s trajectory, represented as an electron cloud sphere in statistical terms. Nevertheless, Schrödinger’s wave functions provide a mathematical framework to describe the quantized motion of the electron.

This paper postulates that the electron is not one of the fundamental particles but rather composed of an internal string structure. Similarly, the proton and neutron, including those in hydrogen isotopes containing one or more neutrons, are also constituted by analogous string structures.

Electrons can traverse protons, engaging in string reactions between their underlying structures. Analogously, electrons can also traverse neutrons, facilitating string reactions within their respective frameworks. This perspective offers a compelling explanation for the electron’s ability to approach, even enter, and subsequently leave the proton’s vicinity. It also clarifies the electron’s probabilistic trajectory, manifesting as a near-spherical electron cloud. Furthermore, it elucidates similar phenomena when neutrons are present within the atomic nucleus. Additionally, it accounts for the intricate interactions among multiple electrons in an atom, where pairs and groups

of three or more electrons can mutually traverse each other’ s paths. These string reactions may subtly adjust the individual electron trajectories, leading to the observed stratification and hybridization of electron orbitals outside the nucleus.

In summary, this model offers a comprehensive resolution to the contradictions surrounding electron motion in hydrogen atoms and, more broadly, in multi-electron atomic systems. In other words, the previous contradictions will no longer exist.

The model presented in this paper has never been described in previous works on string theory [1-10], nor has there been any similar description.[1-13] Previous studies [8-13] suggest that the model in this paper may represent a promising research direction.

1. Model Description

Firstly, let us describe the visual representation of this model in three-dimensional space. As depicted in Figure 1, electrons traverse along the curved paths indicated by arrows, with the central sphere representing the active domain of the atomic nucleus. The electrons exhibit a tendency to move swiftly forward while simultaneously being drawn towards the nucleus. Upon entering this active domain of the nucleus, based on statistical randomness, the electrons engage in a string reaction with the nucleus. When the conditions for this string reaction are met, both the electron and the proton undergo a dimensional reduction to their most fundamental string structures. Subsequent to this reaction, they revert to their original electron and proton configurations, respectively. To an observer, it appears as if the electron has traversed through the proton.

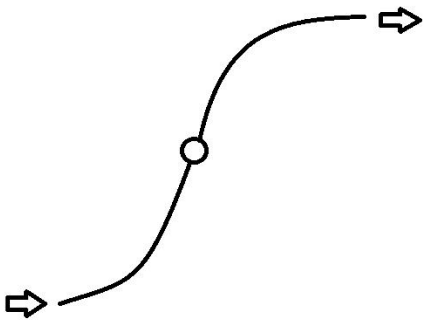

Figure 1: Trajectory of an Electron Near a Proton

The spatial domain within which the string reaction between the electron and the proton occurs is exceedingly vast compared to the dimensions of these particles themselves. Consequently, diverse outcomes of the string reaction emerge. As a result, the trajectories of each string reaction conform to statistical patterns, giving rise to the spherical electron cloud phenomenon observed around the proton’ s periphery.

1.1 Trajectory of Electrons in Vacuum

In a vacuum, the electron moves forward periodically between the three-dimensional space and the higher-dimensional space. From the observer’ s perspective, the electron gradually diminishes in size until it completely disappears into the higher-dimensional space, only to reappear in the direction of its forward motion, gradually growing larger again. This process repeats itself indefinitely. Please refer to Figure 2 for a visual representation.

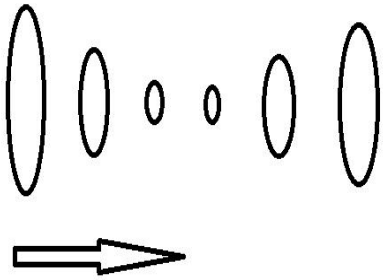

Figure 2: Trajectory of an Electron in Vacuum

1.2 The Trajectory of Electrons When They Encounter Each Other

An electron can be conceptualized as a spherical membrane string that gradually diminishes in size as it progresses, ultimately disappearing from the three-dimensional space to conceal itself within a higher-dimensional realm. Subsequently, it re-emerges from this higher dimension back into the three-dimensional space. Inherently, electrons possess attributes of higher-dimensional spaces. This explains why electrons orbiting around the nucleus of an atom can pass through each other without significantly altering their fundamental properties, although subtle variations in their trajectories may occur.

1.3 The Trajectory of Electrons When They Encounter Protons and Neutrons

Protons, having higher-dimensional properties, vibrate rapidly between three-dimensional space and higher-dimensional spaces in the form of strings. In the majority of instances, it may seem as though electrons traverse through the interstitial spaces between protons and neutrons. However, in reality, various types of string reactions occur, subtly altering the directional motion of the electrons.

2 Definitions and Operational Principles

2.1 Instantaneous High-Energy Pair Fluctuations within Protons and Neutrons

Protons and neutrons are composed of quarks, which can be described as constantly vibrating entities that undergo string vibrations between the three-dimensional space and higher dimensions. Due to their exceedingly rapid vibration speed, quarks appear to remain stationary within the three-dimensional space.

2.2 Instantaneous High-Energy Pair Fluctuations in the Vacuum

It is predictable that, owing to the quark string vibrations, the vacuum regions within protons and neutrons will exhibit numerous random fluctuations of positive and negative quark pairs. These fluctuation pairs seem to emerge and vanish from the vacuum instantaneously.

2.3 String Reactions between Electrons

In most cases, when electrons interact through string reactions, they appear to traverse each other without altering their intrinsic properties. There exists a phenomenon known as electron pair confinement, wherein despite the repulsive force between electrons, their periodic motion in higher-dimensional spaces can result in a complete entry into these dimensions. In such instances, the electrostatic repulsion between these electrons and those in the three-dimensional space ceases to operate. Hypothetically, if an electron is half-concealed within the higher-dimensional space, its electrostatic repulsion other with electrons would be significantly reduced. This phenomenon is called asymptotic freedom of electron pair confinement in higher dimensions.

The definition of string reaction posits that fundamental particles are composed of strings, and their distinct properties arise from the varied vibrational patterns of these strings. When different fundamental particles interact, it is essentially a manifestation of string interactions, which may involve fusion and subsequent separation, restoring the original particle characteristics or generating new fundamental particles.

2.4 String Reactions between Electrons and Protons/Neutrons

The smallest unit of any matter is a string (including strings, string membranes, and string blocks), which undergoes constant string vibrations. Through high-dimensional string reactions, electrons traverse the vacuum regions or quark components of protons and neutrons.

3 Verification and Prediction of Experiments

3.1 Experimental Evidence Indicates that the Electron is a Perfect Sphere. When multiple electrons move outside the nucleus, they exist in a state of mutual non-interference.

The string structure of the electron is a spherical membrane that undergoes periodic vibrations, expanding and contracting, disappearing into higher dimensions, and then reappearing in three-dimensional space. Multiple electrons outside the nucleus can pass through each other without altering their string properties, but their velocity vectors undergo slight changes, resulting in the phenomenon of electron clouds.

3.2 Experiments Confirm that the Interiors of Protons and Neutrons Contain Numerous Random Fluctuations of Quark-Antiquark Pairs.

These fluctuations provide the basis for string reactions to occur when electrons traverse the interiors of protons and neutrons. After traversal, the properties of the electron remain unchanged, but its direction of motion undergoes subtle changes. This explains the phenomenon of electron clouds in hydrogen atoms.

3.3 Experimental Evidence Demonstrates the Existence of Infinite Energy Pairs Undergoing Random Fluctuations in the Vacuum.

This validates the experimental foundation for superstring motion when electrons propagate through the vacuum.

3.4 Prediction: The Fundamental Constituents of Every Elementary Particle Are String Structures, and Interactions Between Particles Belong to String Reactions.

Mathematically speaking, different elementary particles are distinguished solely by the distinct vibrational patterns of their strings. The interactions between fundamental particles, in essence, are manifestations of interactions between different strings.

4 Conclusion

This paper has elucidated the phenomenon of electron clouds in hydrogen atoms and in the presence of multiple electrons outside the nucleus. It posits that every microscopic particle is a constantly vibrating string under varying conditions. Mathematically, it can be predicted that there exist millions of possible vibrational modes for strings. These vibrations can manifest as strings, two-dimensional string membranes, or three-dimensional string blocks. Regardless of the specific vibrational mode of each fundamental particle, high-dimensional string reactions are inherent.

Through the methods of reductio ad absurdum and elimination, this paper confirms the validity of the proposed high-dimensional string model for electrons, which has been verified by numerous experiments conducted by previous researchers.

Since photons are also composed of fundamental strings, the model presented in this paper can also explain the underlying string reaction nature of the photoelectric effect. That is, the photoelectric effect occurs when the strings of photons interact with the strings of electrons, and clearly, the photon and electron strings are quantized. In turn, this proves that the model in this paper is supported by the photoelectric effect experiment.

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