

DAP Law and the Theory of the Twin Antisymmetric Universes

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Abstract: *This research is related to the first research paper concerning the existence of a quantum phenomenon we called Disappearance-Appearance Phenomenon (DAP), it is a law of the atomic electronic transitions. This paper is containing the introduction of our theory of the twin antisymmetric universes.*

Keywords: Quantum jump, DAP, Quantum mechanics, Electronic transitions, particle physics, quantum entanglement, particle physics, particle virtual state, Antimatter, MAIE, cosmology.

1. Introduction

In our first research paper [1] we predicted the DAP law, and in this second paper we are going to show in the first paragraph the consequences of this law, then the second paragraph will be consecrated to the introduction of our theory of the twin antisymmetric universes, such as we are going to construct another interpretation of the particle virtual state and we will see that the phenomenon DAP is a communication event between this twin of antisymmetric universes. Finally we will finish our research work by a general conclusion.

2. DAP and the quantum entanglement

What has caught our attention in the DAP law is the simultaneous disappearance and the appearance of the electron with a corresponding proton in the atomic nucleus. So what does that mean? What is happening between electrons and protons in atoms, and we did not know it yet?

To answer these questions, we will focus firstly on the DAP which occurs in the hydrogen atom to extract what we are looking for. Then we are going to show how this phenomenon of DAP occurs in the other atoms.

2.1 DAP in the hydrogen atom

The simultaneous disappearance - appearance of the electron with a corresponding proton at the atomic nucleus means that there is a quantum entanglement between these particles in the atom. We consider the excitation case of the hydrogen atom from the ground state (It corresponds to the fundamental energy level $n=1$) to determined excited state. When the electron absorbs the sufficient photon energy to excite towards the higher energy level ($n=2, 3, \dots \infty$), Its binding energy at the initial energy level becomes equal to its binding energy at the future excited energy level that corresponds to the future excited state of the atom. So the electron disappears and its antiparticle (the positron) appears with a kinetic energy value equal to the energy absorbed by the electron, for crossing the radial distance between the two atomic energy levels.

The same mechanism happens for the disexcitation case.

When the electron at a higher atomic energy level emits a photon, it disappears because its binding energy becomes equal to its binding energy at the lower future atomic energy level, and the positron appears to realize the radial motion.

Thus, when the electron absorbs or emits a quantity of energy its value equals to the energy difference between the two atomic energy levels, the electron's reality will change. The law of DAP showed that this event of changing electron reality has a spooky action at distance on the proton reality at the nucleus, the reality of the two particles change simultaneously and for this reason this two particles (the electron and the proton) in the atom could disappear together as a single particle.

2.1.1 Consequence

The DAP is a proof of a quantum entanglement [2] existing between the electron and the proton in the hydrogen atom.

2.2 DAP in the other atoms

We are now considering an atom other than the hydrogen atom. In this case, the atomic nucleus is made up of a certain number of protons and neutrons called nucleons.

The electrons number around the nucleus is equal to the proton number. It is evident that the DAP occurs because there is a quantum entanglement between the electrons and the protons in the atoms. And if we imagine that an electron in the atom received a photon of sufficient energy to have an electronic transition from the fundamental level to an excited level, the DAP law implies that this electron should be already entangled with a specific proton in the nucleus.

2.2.1 Consequence

In any atom, each electron is entangled with a specific proton at the nucleus, as a united pair. This kind of quantum entanglement exists between electrons and protons which are the electrical charged particles in the atoms; we will call it the **Charged Atomic Entanglement (CAE)**.

We remark also that the positron and the antiproton of the DAP law, appear and disappear simultaneously, which means that they were already entangled between them via

the CAE in an anti-atom.

2.2.2. Consequence

In the atom, each entangled pair electron-proton has an entangled pair positron-antiproton in a corresponding anti atom.

3. Theory of the Twin Antisymmetric Universes

3.1 Introduction

Through the first research paper [1], we have predicted the existence of the Disappearance-Appearance Phenomenon (DAP), and through the last paragraph we have also clarified the consequences resulting from this phenomenon of nature. But now we are going more far by our imagination again via a physical reasoning based on the particle virtual state [3] problematic, such as we are going to remembering its definition according to the quantum mechanics [4] and the quantum field theory [5], then after that we will show the truth of the particle (and the antiparticle) virtual state. Instead we will come back to the phenomenon of DAP which happens in a small atomic time. Indeed, the next paragraph will be consecrated to the virtual state interpretation for showing the existence of two antisymmetric universes. Then in the second paragraph we will briefly describe the natural connection between their contents via the relation between matter and antimatter. Finally we are going to give another definition of the quantum vacuum followed by a general conclusion of our research work.

3.2 Interpretation of the particle virtual state

Relativistic quantum mechanics [4], specifically Dirac's equation was predicted the existence of the antimatter [6], where Paul Dirac has found theoretically via its equation that the free movement of the electron cannot be described independently on its antiparticle, and this result comes from Dirac's interpretation of the equation solutions. Instead, the solutions with positive energies represent the particle (the electron) and the solutions with negative energies represent the antiparticle (antielectron) which has the same mass as the electron but with an opposite electric charge.

This antielectron has taken the name positron, and since the experimental discovery of the positron in 1932 [7] by Carl David Anderson, the antimatter existence has become a scientific truth.

According to the relativistic quantum mechanics and the quantum field theory, a virtual particle is any particle existing in a virtual state or any particle such as the uncertainty on its associated physical magnitudes does not respect the following inequalities of the Heisenberg uncertainty principle [8]:

$$\Delta x. \Delta p \geq h/4\pi \quad (1)$$

$$\Delta t. \Delta E \geq h/4\pi \quad (2)$$

Where (1) is the inequality position-impulse and (2) is the inequality time-energy.

Generally, any two integrated physical quantities such as the physical measure of one does not affect the precision on the physical measure of the other, it implies that there is between them an uncertainty inequality similar to (1) and (2).

However, we should remark that the *Heisenberg* uncertainty principle differs between all who is real, physical and virtual. Thus, all that is real is physical and the reverse is not true, so the physical appropriated interpretation of all the inequalities of the *Heisenberg* uncertainty principle, is that we will formulate it as follows

"In the quantum world, physics is at certain limits of measurement precision. Any particle has a null or an infinite uncertainty on one or more elements of physical magnitudes; it is a virtual particle. And any particle has not null or not infinite uncertainty on all the physical magnitudes, it is a real particle, And only if all of its physical magnitudes with respect to the Heisenberg uncertainty principle inequalities, it is real and physical particle, Otherwise it is a real but not physical particle".

Thus, the difference between real and physical is determined by the Heisenberg uncertainty principle. A virtual particle is any particle found in a virtual state which means that it does not exist in reality. For example the "virtual particles" as the gauge bosons [9] which are appearing as mediators of the interactions in the Feynman diagrams [10] in different quantum field theories, are real particles but not physical particles, because they exist in reality but we cannot measure them physically. These particles are not really virtual, because according to our new interpretation, the virtual is everything not real. So, these particles are real particles but "not physical" particles.

Now, after clarifying the difference between a real particle, a physical particle and a virtual particle, we are going to find a physical interpretation of the particle virtual state. And to do that, we will focus on the mechanisms of changing quantum states in DAP happening through the excitation of a hydrogen atom from its ground state to a determined excited state.

We know that DAP is a natural phenomenon or a law of nature working deeply in the quantum world. But here we will define the DAP as the event of the changing or switching quantum states process between matter particles and antimatter particles in the atom and anti atoms, through the temporal period which has the magnitude order 10^{-13} of the atomic electronic transition.

In the hydrogen atom the DAP event takes exactly the temporal period 3.2×10^{-17} s, during the excitement or dis-excitement between the ground state and the first excited state.

Now, it is intuiting that before the DAP event, each of the electron, the proton, and the hydrogen atom itself is existing in a real state. In contrast each of the positron, the antiproton

and the antihydrogen atom itself is existing in a virtual state. Then all these particles will contribute to the process which happens in DAP in order to realize the electronic transition between two atomic energy levels in the hydrogen atom and the positronic transition in the antihydrogen atom. We have already shown the fact that each electron-proton pair in the atom and each corresponding positron-antiproton pair in the anti atom are entangled between them as the single particles. Now, curiosity pushes us to determine the nature of the mysterious connection between the matter particles and the antimatter particles. We know well that this mysterious connection is simultaneous and instantaneous, so it is nothing but another kind of quantum entanglement. We are going to call it: **Matter-Antimatter Inter universal Entanglement (MAIS)**. The origin of this name comes from our new physical theory of the existence of twin antisymmetric universes: The universe of matter which we are belonging to and another universe of antimatter, such that their contents of matter and antimatter are entangled between them. So, DAP is a natural communication event between these two entangled universes.

Now, we will construct a physical interpretation of the particle virtual state from the point of view of our theory as follows:

"The particle in its real state, it belongs to our matter universe, but when it takes a virtual state it becomes belonging to the antimatter universe. In contrast, the antiparticle in its virtual state is belonging to the antimatter universe, but when it takes a real state it becomes belonging to our matter universe. These two universes are antisymmetric, evaluated simultaneously, continuously and each material part of our matter universe is entangled with its corresponding anti material part in the antimatter universe. The particle (or the antiparticle) real state represents its existence in our universe of matter, then the antiparticle (or the particle) virtual state represents its existence in the antimatter universe".

It is this virtual state interpretation that explains the asymmetry [11] problem between matter and antimatter in our universe.

3.2 Theory of the twin antisymmetric universes

This theory of the twin antisymmetric universes is based on our theoretical prediction of the DAP law in our first article [1]. In fact the Disappearance-Appearance Phenomenon (DAP) which happens through the atomic electronic transition is a natural event of communication between the two antisymmetric universes through the Matter-Antimatter Inter universal Entanglement (MAIS) that we defined previously.

These two antisymmetric universes are twin and were created from the same origin. They evaluate parallel and simultaneously by the same physical laws, through the **MAIS** between their contents of matter and antimatter. The antimatter universe we will call it simply the *anti universe*. In fact, a double Big Bang has happened symmetrically before 13.8 billion years ago. A Big Bang [12] happened to expanding the small space-time and another Big Bang was

happened to expand the corresponding symmetric space-time. In fact, the Einstein's formulation of Mach principle [15] is applicable to the anti universe. The general relativity theory [13] has already predicted also the existence of a twin universes [14] and this result is in compliance with our theory of the twin antisymmetric universes which is based principally on the existence of DAP law [1]. The experimentally confirmation of its existence in reality, it is the official confirmation of our theory.

4. Mass Conservation Law

The fact that the particle and the antiparticle have the same mass, implies that the matter quantity of our universe is equal to the antimatter quantity of the anti-universe. However, these two twin antisymmetric universes are in continuous and instantaneous interactions between them by a regulated exchange of the matter and the antimatter particles. We draft the mass conservation law as follows:

"The continuous, instantaneous, and simultaneous exchanges of the particles and the antiparticles between the two twin antisymmetric universes are happening with the condition that at any time, the matter quantity in the universe equals the antimatter quantity in the anti universe".

5. Interpretation of the quantum vacuum

Quantum physics has found that the quantum vacuum [16] is not an empty space-time, but an equivalent mixture of the matter particles, the antimatter particles, and the energetic particles. However in reality our theory implies that:

"There is no vacuum, but we can consider that each one of the two twin antisymmetric universes is a quantum vacuum in relation to the other".

This consequence comes from the fact that there is no reason to imagine the vacuum as a border between the two universes.

Let us see for example the annihilation electron-positron phenomenon [17] e^-e^+ from the point of view of the twin antisymmetric universes theory:

The annihilation e^-e^+ is a transition in the same time of this pair from our universe to the anti-universe by taking virtual states, and they leave two photons with an energy quantity E its value depends to the initial velocities of the two particles e^- and e^+ . So we have $E \geq 2mc^2$.

This energy is divided by the two photons 2γ which come from virtual states in the anti-universe to our universe by taking real states. In fact, the inverse event has happened parallel in the anti-universe, where the collision of these two photons has created the same e^-e^+ pair with the total energy $E \geq 2mc^2$ in the anti-universe, we clarify that as follows:

The e^-e^+ pair which has disappeared from our universe by annihilation between them is the same pair that appeared in the anti-universe by a collision between the same pair of photons 2γ which appeared in our universe in opposite directions through the annihilation electron-positron

phenomenon. Thus, generally, all the events in the anti universes happened parallel but inversely with the events in our universe.

6. Conclusion

Through this research paper, we clarified the consequences of the **Disappearance-Appearance Phenomenon (DAP)** in atoms, which was predicted in our first research paper. And we have found that the DAP is a proof of a quantum entanglement existing between each electron-proton pair in the atom and each positron-antiproton in the anti atom. This kind of entanglement between the charged particles in the atom we have called the **Charged Atomic Entanglement (CAE)**. Finally we introduced our new physical theory where the phenomenon of DAP event is a communication event between a twin of antisymmetric universes: An universe of matter which we are belonging to, and its antisymmetric universe of antimatter we call it simply anti universe, the contents of these universes are entangled between them through another kind of entanglement caller **Matter-Antimatter Inter-universal Entanglement (MAIS)**. We also tried to briefly describe the natural relation between these two antisymmetric universes which were created from the same origin with a double Big Bang. We have also defined a conservation law of the mass to explain the natural exchange of matter and antimatter between the two antisymmetric universes, and finally we have explained why the quantum vacuum is not empty.

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