

IS A FIELD AN INTELLIGENT SYSTEM?

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HIGHLIGHTS

- This paper proposes that a field performs computation and is intelligent. The field behaves like a bright, innovative system. A system that acts like it has a brain that knows exactly where to go and what to do.
- A short review of quantum field theory and the field's behavior informs us that the field behaves as though it is embedded with consciousness.
- The investigation results inform us that several phenomena in the universe maybe understood if we can think of a field as an intelligent entity that performs various computational operations.
- The paper suggests introducing consciousness in the physics equation to tackle the many unsolved physics problems, such as the quest for the theory of everything.
- The writer proposes introducing the subjective experience of consciousness into orthodox quantum physics, loop quantum gravity and string theory.
- The analysis results reveal the fundamental role of consciousness in physical science through the understanding of the field and its role in running the universe.

ABSTRACT

The majority of physicists take it for granted that the universe is made up of matter. In turn, matter is composed of atoms; atoms are made up of particles such as electrons, protons, neutrons, etc. Also, protons and neutrons are composed of quarks, etc. Furthermore, that everything in nature is governed by the known laws of physics and chemistry. The author only partially shares this view. He argues that many phenomena in the universe may depend on rules or factors as yet incorporated by the physical sciences. The last few years have led him to reflect on the many unsolved physics problems, such as the quest for the theory of everything (ToE), the arrow of time, the interpretation of quantum mechanics, the fine-tuned universe, etc. to mention just a few. The author posits that a field carries information, performs various mathematical and computational operations, and behaves as an intelligent entity embedded with consciousness.

KEYWORDS

Consciousness, Diffraction, Field, Information, Interference, Loop quantum gravity, Quantum field theory, Quantum gravity, Quantum theory, String theory, Theory of everything.

1. INTRODUCTION

In his forthcoming book [1] entitled *Digital Physics: Consciousness Is Primary*, the author argues that our conventional approach to science and physics is too restrictive and limited because of our attempts to understand everything in terms of matter and energy only. Besides, since he was a little boy living in the Democratic Republic of the Congo, he believed that consciousness is primary and is the source of everything. Furthermore, he realized that consciousness is a creative force that shapes the universe or nature, including its matter, through fields and waves that carry information. Likewise, with this firm conviction in mind, he saw a possibility to outline a new way of looking at physics by incorporating consciousness into the physics equation.

The writer asserts that if we are to make much progress in the quest of quantum gravity theory (this is a theory that attempts to develop scientific models that unify quantum mechanics (i.e., tiny things) with general relativity (i.e., huge things), as well as the search for the theory of everything (ToE) [2]; we should think carefully about the role of consciousness in science and physics [3].

Therefore, this article's purpose is to explain the fundamental role of consciousness in physical science and its role in running the universe, including in matter and particles. The writer's view is that it is simply wrong and unbelievable to deny consciousness its causal role [4]. In the following pages, he aims to establish its prominent position by insisting that consciousness is fundamental. Despite the progress made in search of the ultimate theory of nature, we are still far away. However, suppose we acknowledge the role of consciousness in running the universe, we might remove barriers that have stopped us from making progress.

As brilliant and successful as string theory (ST) and loop quantum gravity have been over the last twenty years, they must not be viewed solely regarding matter, field, and energy. ST is our leading ToE; it replaces subatomic particles with strings, while loop quantum gravity is one of the candidates for a quantum theory of gravity. Loop quantum gravity (LQG) is based on classical general relativity. One of the most vital conclusions of LQG is that gravity should be quantized [5]. Despite their successes and achievements, these two theories also have their shortcomings. These were pointed out by the British physicist Roger Penrose [6] and several other researchers, such as Andrei Linde [7]. It is a fact that these two theories were built without mentioning the role of consciousness, discussed in the work of the Indian physicist Ram Lakham Pandey Vimal [8]. It was built up with no reference or mention of consciousness. The author firmly believes that consciousness is an essential and fundamental missing ingredient in these two theories. The next stage in physics development should incorporate consciousness as an ingredient and part and parcel of these two theories.

After this short introduction, the paper includes a section entitled "The Intelligent Field," which comprises two sub-sections. The first is a brief discussion of "quantum theory" that covers some basics, elementary notions, and necessary concepts required so that our readers can understand the following sub-section titled "Quantum Field Theory (QFT)." In that section, he discusses some essential concepts of this subject and uses the concept of field, well-known and documented, to explain the field's behavior regarding computation and consciousness. Furthermore, to illustrate the role of intelligence or consciousness in physics, the author argues and shows how waves behave like intelligent entities embedded with consciousness through the well-known phenomenon of diffraction and interference of light.

This introduction has explained the need and motivation for this article. This paper proposes a novel way in which we can understand the field as an intelligent system. Ultimately, the author believes that while physics has advanced in understanding everything from the perspective of

matter and energy, there are still many limitations and challenges. Therefore, a new way of finding the theory of everything is needed. Suppose a field performs various calculations as if it were embedded with consciousness and could create (creativity). In that case, we must integrate this new method to solve many problems faced by theoretical physics. The paper study finishes up with suggestions for additional work. More or less, this paper aims to outline a novel way of understanding the concept of the field of how a field performs various computations and behaves like an intelligent system.

2. THE INTELLIGENT FIELD

2.1. Quantum Theory

Quantum theory or quantum mechanics attempts to explain physical behavior at atomic and subatomic levels. Particles smaller than an atom are known as subatomic particles. There are two kinds of subatomic particles—elementary particles, which are not made of other particles, and composite particles made of several particles. Quantum theory is our most successful theory. So far, it has not been contradicted by any experiments [9]. Furthermore, we would not be discussing the global economy or the information age if quantum mechanics was not a branch of physics. Indeed, many areas of science have benefited from quantum mechanics. Advances in chemistry, electronics, genetics, biology, and other related sciences could not have happened without a deep understanding of atoms.

Although despite its successes, there remain many unanswered questions and puzzles to which science has not given satisfactory answers [10]. Let us point out the existence of one of the most important equations of physics. The Schrödinger equation (the wave equation) is the equation governing quantum mechanics. It is a universal equation of physics because it describes the behavior of light, sound, water waves, and many other phenomena. The time-dependent Schrödinger equation, which gives a picture of a system evolving with time, is given by:

$$\hat{H}\Psi(x, t) = i\hbar \frac{\partial}{\partial t} \Psi(x, t) \quad (1)$$

Ψ is the state vector of the quantum system (Wave function).

t is time.

\hat{H} is an observable, the Hamiltonian operator.

We have learned from quantum theory that everything we thought was solid or physical is not physical. The quantum world appears to us like an invisible world because of our inability to see the tiny particles or fields with our naked eyes. We do not see the electrons or vortices of energy, which means that we have partial knowledge or are not aware of the true profound nature of matter. The electromagnetic spectrum teaches us plenty of lessons. We can only see less than 1/10 billionth, meaning only less than 1% of the light spectrum [11]. So, everything passing before us, through our bodies and the universe, is entirely invisible to our naked eyes. What does this mean? Simply put, we are only shown a portion of the reality of what is going on, or putting it another way, we can only see a portion of the truth with our own eyes.

Our naked eyes cannot see this ongoing arithmetic or computation taking place, where precise calculations are executed. For instance, when two atoms combine, they exchange information effortlessly, create new arrangements, etc. During this ongoing computation, instructions are sent to develop different particles, matter, and other things in the universe. What then can we not see? Let me emphasize this point once more; the human eye has a limited ability to see beyond a

specific spectrum. We can only see visible light(see Figure 1). However, we learn from electromagnetism that light reaches us in various colors, such as infrared, ultraviolet, X-ray, and gamma-ray, which are invisible to our naked eye. We can learn more about this discussion by looking at the concept of field.

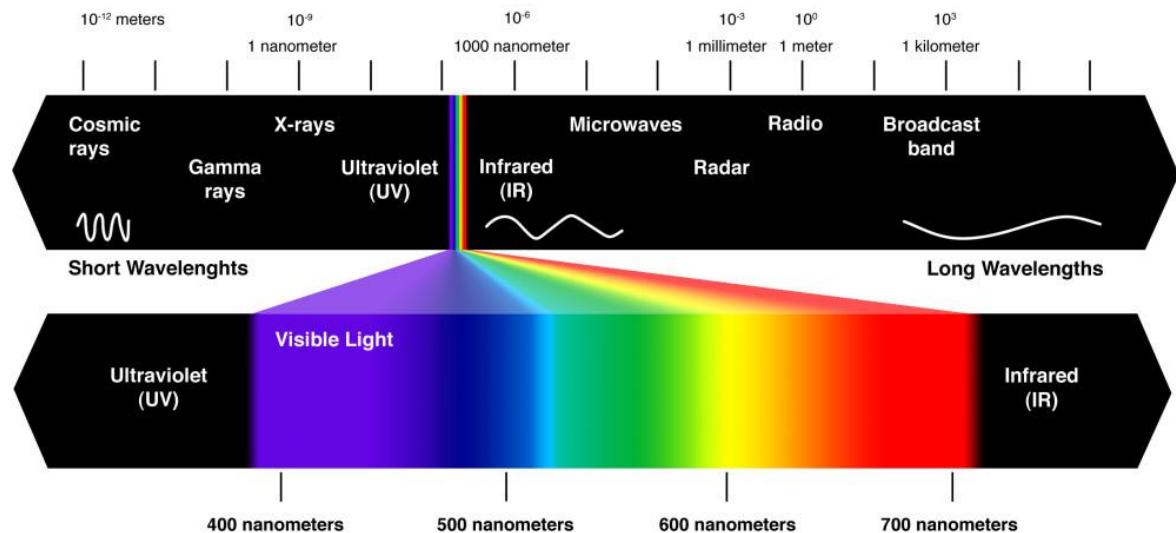


Figure 1. Visible light of the electromagnetic spectrum. Image via [<https://www.pinterest.com/pin/502925483387631482/>].

2.2. Quantum Field Theory (QFT)

In an article entitled: "There are no particles, there are only fields," Prof. Art Hobson [12] asks: Are the fundamental constituents [of the universe] fields or particles?". He responds by saying: "As this paper shows, experiment and theory imply unbounded fields, not bounded particles, are fundamental." (2013, 1). This statement sums up what the proponents of quantum field theory (QFT) strongly believe are the fundamental components of matter. What is QFT? It is a theoretical framework that combines classical field theory (a physical theory that predicts how one or more physical fields interact with matter through field equations), special relativity (an approach that deals with conditions in which gravitational forces are not present), and quantum mechanics (QM) but excludes general relativity's gravity description [13]. In QFT, particles are treated as excited states of their underlying fields. The fundamental objects of QFT are quantum fields.

The idea behind QFT is that what we call subatomic particles, such as electrons, protons, and quarks, are simply excitations in the fundamental fields. Many physicists have leaned toward an all-fields perspective and suggest that evidence exists for physicists to agree on supporting an all-fields view. See, for instance, the works of Prof. David Tong[14] and Dr. Ethan Siegel [15]for in-depth reviews. According to QFT, the universe's fundamental building blocks are not discrete particles such as electrons but are continuous fluid-like substances, called fields. Examples of the fields include the electric field and the magnetic field. An example of a magnetic field emerging from a magnet is shown in Figure2.

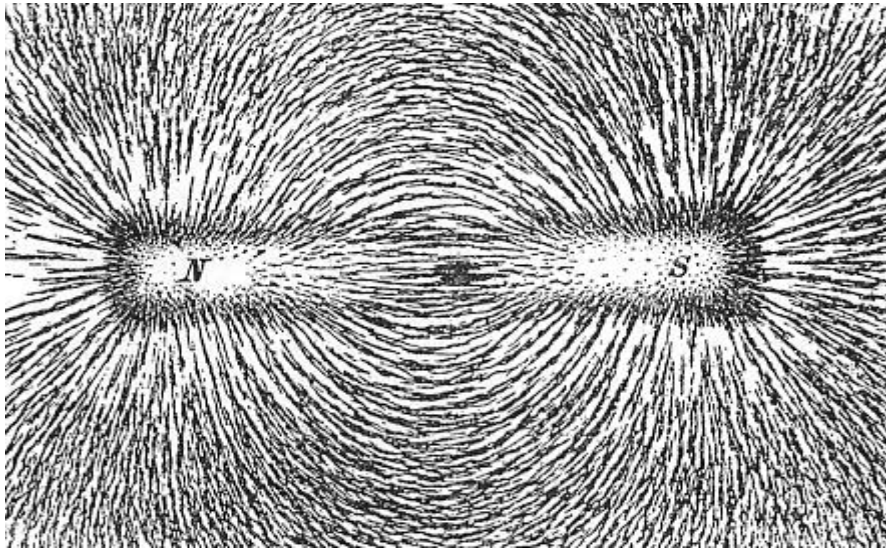


Figure 2. Fields emerging from a magnet. Image by Newton Henry Black - Newton Henry Black, Harvey N. Davis (1913) Practical Physics, The MacMillan Co., USA, p. 242, fig. 200, via [https://commons.wikimedia.org/w/index.php?curid=73846]. (Creative Commons CC-BY-SA-4.0license.)

Instead of talking about particles, those working in the QFT field discuss everything in terms of fields. That is why they talk about electron field, quark field, gluon field, Higgs boson field, etc. A particle is simply a tiny ripple of the underlying field, shaped into a particle by QM's effects.

We learn from QFT [16] that there are 12 fields. These fields fill our planet and, indeed, the entire universe. We know from QFT that the 12 fields give matter, and four other fields are the forces. In a nutshell, our universe is the blending of these 16 fields interacting together. Besides, we have the so-called Higgs fields, responsible for the mass of everything. The 12 matter fields are made of six quarks fields for Up/Down, Charm/Strange, Top/Bottom quarks, 6 Leptons/Electron, Muon, Tau, and their respective Neutrinos.

On the other hand, the four force fields, embodied by the electromagnetic force and carried by photons, create electric and magnetic fields. It is responsible for chemical bonding and electromagnetic waves. Much of this and QFT's fundamental concepts and theory have been discussed by Prof. Art Robson [17]. In a nutshell, the bonding and interaction inform us that intelligence is present with computation taking place.

The idea of fields has been introduced to explain the nature of matter from the viewpoint of a sub-branch of physics called quantum field theory (QFT). From this viewpoint, electrons in atoms are not particles or solids stuff; they are probability fields. The interference (computation) of these fields (waves) determines the physical world. My understanding is that the calculations of waves assess and create different structures in the universe, from the biological, chemical, physical, and biological standpoints and then manifest in the physical world. These interactions are continuously ongoing, running the universe. These fields behave like an intelligent system.

These fields are embedded with information and perform complex computations; complex mathematical operations; the fields behave like intelligent living entities that know what they are doing. The outcome of any of their interactions is already known; during the ongoing computation and information exchange, reality becomes non-material. One way of putting it is illustrated in Diogo Valadas Ponte's work, and Lothar Schäfer [18] stresses that since they can exist in the empirical world and function in it, the forms are actual, even though they are

invisible. We must now accept the entire visible universe as an emanation from a non-empirical celestial context, with the emanated world acting as a secondary reality.

To stress once again, QFT tells us that matter or the universe is not made of particles, but rather fluid-like substances known as fields. These fields are spread throughout the universe. QFT extends the notion of the particle from QM from a single particle to fields that extend to the universe. The premise of QFT is that matter or the universe is made of fields. QFT informs us that atoms are made up of vortices of energy. All particles in the universe, in you and me, are waves of the same underlying field. The particles in an atom are simply ripples of the same field as the particles in a river.

The above reasoning shows it is possible to understand QFT theory in terms of information and consciousness. In doing so, what the proponent of QFT calls fields is an intelligent system (intelligent fields). The fields carry information, perform computation, and self-organize. This process hints at the presence of intelligence or consciousness. Why not create or develop a sub-branch of QFT called: "The Computational Theory of Fields?"

2.2.1. Diffraction and Interference of Light

To illustrate, once more from another viewpoint (waves), let us consider the phenomena of diffraction and interference of light shown in Figures 3a and 3b. We can then analyze it in terms of computation and intelligence. One way to illustrate the calculation, instant computation, and presence of intelligence (consciousness) is through diffraction and interference (Figures 3a and b). Diffraction is a phenomenon better explained when light or any other type of wave goes through a narrow apparatus, a single slit, or a double-slit instrument. Figure 3a shows how waves (light waves) from a single source are diffracted at both slits S_1 and S_2 . We see how the waves diffracted by both slits combine through the principle of superposition.

From the principle of superposition, we learn that if two waves interact at a point in space, the net disturbance is the sum of all the interferences created by each wave. It is also the case for an infinite number of waves that interact with one another. We see here that instant calculations are happening; waves are computing. The waves behave as if they know what they are doing. From OpenLearn [19], we learn that: Because the waves originate from the same source, they are in phase at the slits. The waves diffracted by S_1 and S_2 combine using the principle of superposition at any point beyond the slits.

There are two outcomes for the waves coming out of slits (1) and (2). The first is constructive interference. When the wave from slit (1) and slit (2) arriving in screen (S) are both in phase, the resultant disturbance is the addition of the disruptions caused by the waves. However, when the waves coming from slit (1) and slit (2) reaching the screen (S) are out of phase, the two disturbances nullify each other, and we speak of destructive interference.

To summarize, my understanding of QFT, combined with the concept of information, tells me that field has consciousness in its true and original nature. The field is simply consciousness that materializes and is seen through our senses of perception as matter. Therefore, matter is a passing state of consciousness. It is through movement, computation, and information exchange that consciousness turns into matter.

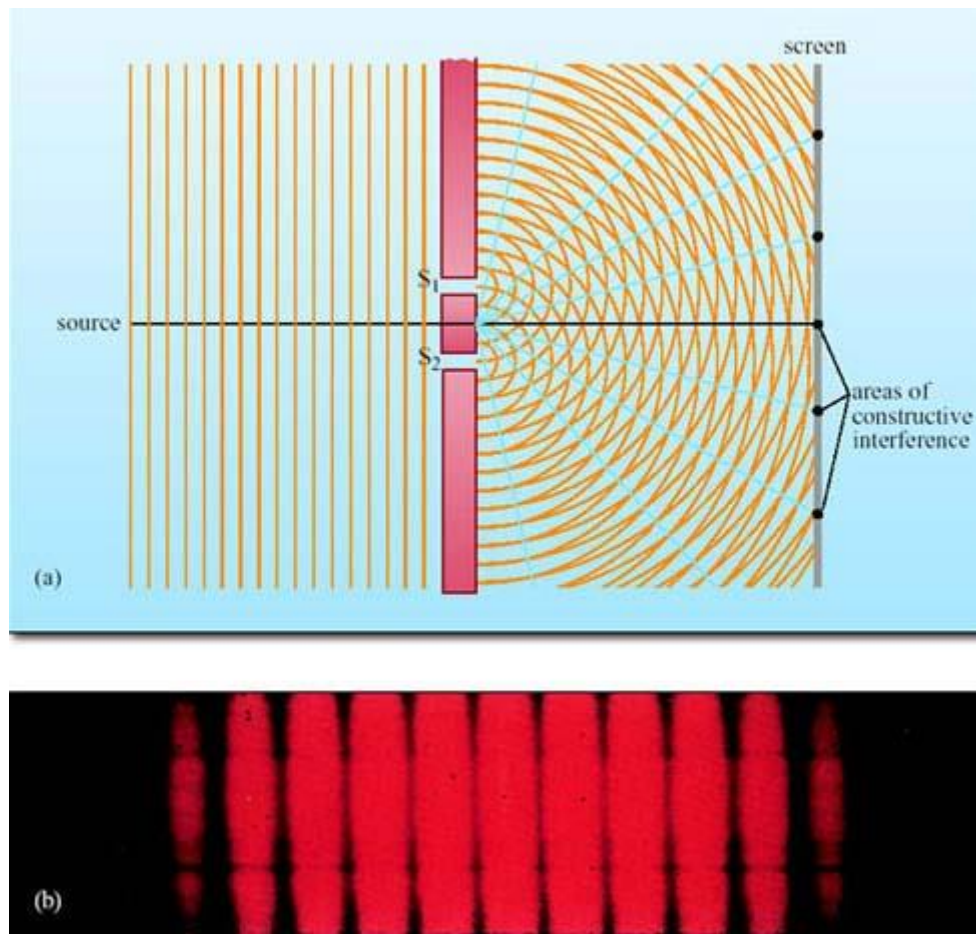


Figure 3 (a) Light diffraction and interference caused by two narrow slits, S_1 and S_2 . (b) Interference fringes on the screen that are bright and dark. Reproduced and adapted from OpenLearn 2020 [20].

QFT is a theory of intelligent fields, meaning of information and consciousness. The fields carry information that performs computation, self-organizes, and shows the presence of intelligence. Information exchange and interactions between fields give rise to what we see in the physical form or object. A detailed theoretical, computational theory of fields might provide us with a clear picture of what the universe is computing and what kind of operations is performed.

3. CONCLUSION

This article aimed to propose a new way of understanding the universe and posit that the running of the universe, matter, energy, atoms, electrons, and fields are all grounded in consciousness. The realization is that this line of reasoning generates grounds for addressing issues and many unanswered questions in theoretical physics. In reiteration, the aim was not to discuss consciousness, per se. Several eminent researchers have conducted much scientific research on consciousness, see for instance,[21].

Let me stress once again. As brilliant and successful as ST and LQG have been over the last twenty years, they must not be viewed solely regarding matter and energy. One additional component called consciousness is needed to unlock their secrets. If we are to make progress, we should incorporate consciousness as an ingredient and part and parcel of these two theories of physics.

We learn from QFT that subatomic particles are not physical objects or discrete entities but rather fields. Particles are continually in a state of vibration. An elementary particle is a vibration of an underlying quantum field, and the particle is the field. This underlying field is intelligent. The field carries information, performs computation, self-organizes, and is creative. In a nutshell, its ability to create is one of its most important characteristics. Field, in its original nature, is consciousness. Furthermore, matter is a form of consciousness that materializes and is seen through our senses of perception.

To summarize, this paper has put forward a new idea. It is hoped that this framework might lead to a novel understanding of the concept of the field. The author has shown that a field performs computation and is intelligent. The field behaves like a bright, innovative system. A system that acts like it has a brain that knows what to do.

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