

Quantum Physics Lends Support to The Basic Concept of God

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Basic Concepts

Fundamental to all religious traditions, God is conceived as an abstract spirit that creates, upholds and administers everything in this universe.

However, these are cognitive concepts, which have been an integral part of the culture of the world through millennia. But they were not validated by the scrutiny of the objective method of science. With the emergence of modern science and its pervasive influence on our daily lives today, we are now generally more inclined to accept concepts that are supported by objective knowledge of science. Interestingly enough, the emerging concepts of modern quantum physics are lending support to the fundamental concepts of God.

However, we should emphasize that science is not meant to replace religion but to compliment it. In Einstein's words, "Religion without science is blind. Science without religion is lame". Science is always a work-in-progress. It gives us some knowledge now, but the horizon of that knowledge is ever- increasing. What is a puzzle today seems to become clear in successive generations. Also, we have to accept the possibility that science may never be able to give all the answers except for a purely mathematical one, without conceptual explanations. Perhaps that is the way it should be. If we knew everything, life might be boring. It is more interesting to live in a world where our horizon of knowledge is always expanding. But, as opposed to knowledge, spirituality and religion deal with subjective experience. Although knowledge can guide us in the right direction, it is ultimately the experience that matters in life. Knowledge cannot substitute experience. Therefore, religion and science will remain complimentary to each other. From this perspective, let us now explore how quantum physics supports the basic concept of God.

The Three Layers of Reality

Though we only see one of them, there are in fact three layers of reality. The first one we experience. The other two are invisible and abstract. All the physical objects and the phenomena happening around us are not illusory but are quite real. However, what we are seeing is only the first level of reality, which is by no means all there is to it. This day to day reality of ours is only the tip of the iceberg. If you look through a powerful "microscope" as a physicist would, you will see that everything is made of invisible atoms. What is an atom made of? It is made of a central nucleus with electrons around it. The nucleus in turn is made of quarks. All matter that we see and deal with is essentially made of two fundamental particles—quarks and electrons. These again are nothing but packages of energy. Einstein's insight revealed to us that matter *is* energy.

We call quarks and electrons fundamental particles, because they cannot be divided any further. There are a number of other fundamental matter particles as well, but they are either unstable or interact very weakly. So we do not deal with them except under special circumstances, such as in the high-energy particle physics laboratory.

One of the most mysterious aspects of quantum physics is that identical fundamental particles like electrons are absolutely identical anywhere in the universe, no matter when or where they are created. Their mass, their electric charge and their spin are always the same. This mystery was resolved in the last half of the past century by demonstrating that an all-pervading underlying field creates them. A new branch of quantum physics called the quantum field theory, developed by combining special relativity with quantum mechanics, gave rise to this revelation. Professor Wilczek of MIT asserts, “In quantum field theory, the primary elements of reality are not individual particles, but underlying fields. Thus, for example, all electrons are but excitations of an underlying field, naturally called the electron field, which fills all space and time.”

The success of the quantum field theory in explaining all the observed fundamental particles is a hallmark of twentieth century physics. Physicists are so convinced about its validity that they have constructed what is known as the standard model of particle physics, which categorizes the observed fundamental particles in a manner somewhat similar to the well-known periodic table of atoms. Yet, most people are not familiar with the quantum field theory and its profound impact in our understanding of the ultimate reality, perhaps because of the very esoteric mathematics involved in dealing with the quantum fields.

Obviously, when we talk about a field in science, we are not referring to a field that a farmer uses to raise crops, neither are we talking about a football field. A scientific field is an invisible, abstract entity that underlies material reality. Even for physicists, development of the concept of an abstract field as a part of reality took the entire period of 200 years from Newton to Einstein. Unfolding the ultimate nature of fields in terms of quantum physics occurred just recently. Its essence is yet to permeate public consciousness; but it should to give us a more accurate view of reality.

While everything seems so concrete and inert to us, it is actually made of an abstract substance: energy. Why do things appear as inert when inside each fundamental particle, energy is moving at the speed of light. Because energy is bottled up, like the genie in the bottle—except these bottles are not physical, they are fields.

So the second layer of reality is an interplay of an abstract substance, energy. Even the physicists do not know what energy is. However, because we deal with it everyday, and because it is physical though abstract, we have a pretty good idea about energy. But when we think about what controls energy—which are the fields—that is really abstract, because they are not physical at all. As an example: the earth’s field of gravity. We cannot see it. We cannot touch it. We go about our daily activities without even thinking about its existence. But it is essentially real, abstract but real. Although it is difficult to grasp, we must embrace the fact that the primary reality of the universe is the fields, which are very abstract.

The three layers of reality are now evident— the first layer of our daily visible reality, and underneath, the second layer of the invisible organization of energy, which is governed by the third layer, the primary reality of abstract fields.

Unified Field—The Source of Everything

We encounter a number of fields in nature. But these diverse fields are now being proven to be nothing but different aspects of only one field.

It was the genius of Einstein that gave credence to the idea of a unified field of natural laws. Einstein envisioned that the known force fields that control all natural phenomena have a simple unified foundation. His belief was so strong that he spent the last thirty years of his life trying to prove this concept. But his dream remained unfulfilled until recently.

The puzzle that Einstein was not able to resolve, but contemporary physicists have come close to explain, is—why, if everything is made of one single substance, energy, do we have different forces in nature for its manifestation? About 150 years ago Maxwell demonstrated the unification of electric and magnetic force fields, which we call the electromagnetic field. Not until the 1960's, however, were scientists able to fully glimpse the existence of the unification of all the forces. Extraordinary progress has been made, since then, to indicate the unification of three of the forces: electromagnetism, weak and strong nuclear forces. Discovery of the unity of such diverse forces has broken the barrier in physicist's minds toward acceptance of the fact that all of reality originates from one universal source.

Although a consistent mathematical formulation exhibiting the unification of all the fields is not yet complete, physicists are quite sanguine that it will be accomplished in the foreseeable future. What gives them such confidence is the fact that the strength of interaction of the diverse forces becomes equal at nature's own dimensions, the Planck's dimensions.

Our civilization depends on some agreed upon units of length, mass and time such as meter, kilogram and second. But these are just man made. Interestingly, nature has its own units of measurement for length, mass and time which are the same throughout the universe. Max Planck calculated the value of nature's units of measurement in terms of our own units using three physical constants, the velocity of light in vacuum, Newton's gravitational constant and Planck's quantum of action. These units are called Planck's dimensions in honor of their proponent.

When we extrapolate our laboratory measurements to Planck's dimensions using the highly successful quantum field theory, the strength of interaction of all the forces becomes equal. Again, according to Wilczek, "From its much inferior strength at accessible energies, gravity ascends to equality with the other interactions at roughly the Planck scale. Thus, we discover that all the coupling strengths become equal simultaneously. Even in the absence of a detailed theory we find here a concrete, semi-quantitative indication that all of the basic forces arises from a common source." Unification of force fields and matter fields is presumed to be facilitated by nature's supersymmetry at the Planck's scale, where all the fields should behave as just different aspects of one field, the super-unified field or the unified field, in short.

The distinction of energy in its various forms, for example, electrical, mechanical, chemical, heat and light is again man made. Nevertheless, in fact they represent only one substance: energy. Similarly, the division of the four forces of nature is merely man

made in order to facilitate scientific investigation. There is no other deeper significance to this division. So it should be no surprise to find that everything comes from one single source.

In the meantime, cosmology, the study of the biography of the universe, has been established as a scientific subject—a long way from its speculative philosophical discourses of the past. When the universe began about 15 billion years ago, none of us was there, nor were we consulted. So how do we research the biography of the universe? Fortunately, nature has left some telltale evidence of the onset and the evolution of the universe. Like a detective, we can pick up those pieces of the puzzle and put them together, using knowledge gained in the laboratory and the mathematical framework provided by Einstein. This cosmic Sherlock Holmes detective story depicts the probable scenario that the unified field, having the blueprint of the entire universe, sequentially unfolded to create our universe.

In the process of unfolding, it created the energy that everything in the universe is made of, at the same time creating an equal amount of negative energy in the form of mutual gravitational attraction of all its contents. Therefore, strange as it may sound, the total energy of the universe is zero. Allen Guth of MIT once remarked, “It is said that there’s no such thing as a free lunch, but the universe is the ultimate free lunch.”

It is amazing that we have been able to reconstruct the biography of the universe, except for a very minute fraction of a second at the very beginning. The biography of the universe studied so far points to the unified field as the likely source of the universe with all its contents including us.

We also find that this abstract unified field pervades everything today being encoded in space itself. How can that be? In our day to day experience, space is just a stage where events play themselves out. How can the unified field be encoded there? The very idea defies common sense. We cannot see space. To us, space seems like an idle observer. But Einstein revolutionized this notion of space. In a global universal context, he showed that spacetime is not absolute, but moldable. Contrary to our daily experience, space—which appears to be formless—can actually be curved, due to the gravitational field of the contents of the universe. The Hubble space telescope provides some graphic demonstration of curved space around a galaxy. “Mass grips space by telling it how to curve and space grips mass by telling it how to move,” said physicist John Wheeler, in describing gravity. Obviously, space is not an idle bystander. Also Wilczek maintains, according to modern quantum physics the space, which evolution has selected us to regard as an empty background is in reality a highly structured, responsive and dynamic medium.

Furthermore, Einstein showed us that space, time and field could not exist separately; they are always intertwined in their existence. A field is a physical state of space itself and space cannot exist without a field. Thus, encoding of the abstract unified field in space itself can in fact be a reality.

In summary, the unified field, containing the blueprint of the entire universe and being present in the initial element of space, sequentially unfolded to generate this universe and everything it contains. After generating the universe, it is also present at the very fabric of space everywhere today thereby determining the underlying aspects of all phenomena of this universe. This is quite similar to a reality with which we are more familiar; our DNA consisting of 23 pairs of chromosomes, which is present in the very

first cell, the fertilized ovum, possesses the blueprint of an entire human body. After spawning the body, it is also present essentially in each cell of the body, administering the basic aspects of the bodily functions.

By now, it should be apparent that modern scientific discoveries of quantum physics lend support to the concept: behind our daily reality, there is an all-pervading abstract entity. This entity, the unified field of quantum physics, points to the essential substance for the notion of God of the Western culture and Brahma of Vedic concepts of the East. According to both the basic concepts of God and quantum physics, this entity having created this universe is also present everywhere thereby supporting and governing everything in this universe. Everything changes except the unified field, just as God or Brahma is eternal. However, God in our perception is not only abstract but a spirit as well. Is the abstract entity associated with the quality of consciousness?

Quantum Physics and Consciousness

When it comes to the subject of consciousness, most scientists seem to feel rather uncomfortable. Because consciousness is a subjective phenomenon. It just happens. Scientists cannot analyze it, since they do not have a detector. The only detector of consciousness is another conscious being. Consequently, most scientists try to avoid this subject of consciousness, which has remained relatively unexplored. Although science cannot yet tell us the source of consciousness, the awareness aspect of nature seems to be impressively indicated in the microscopic world of fundamental particles and quantum fields.

The pioneers who developed quantum mechanics, Heisenberg and Schroedinger, were awed by a sense of this awareness in nature. Heisenberg said that nature is aware in a sense that we are aware of each other. Schroedinger went one step farther maintaining that consciousness is the very basis of all creation. The father of the quantum concept, Max Planck, agreed, saying, "I regard consciousness as primary. I regard matter as derivative of consciousness." In addition, the famous physicist and astronomer Sir Arthur Eddington declared, "All through the physical world runs that unknown content which must surely be the stuff of our own consciousness." Many contemporary scientists have continued this notion of consciousness being an integral part of the universe, especially in light of some recent developments of quantum physics.

Physicist John Bell's postulate and its many recent experimental verifications have convinced the world physics community that the fundamental description of nature in terms of the mathematical language of quantum physics is indeed precise. An entity known as the wave function contains a complete mathematical description of a quantum system. But unfortunately, we have no way to access what it means in terms of an objective physical reality. Because when we try to measure, we only get a probability rather than a precise value of the object of measurement.

Here, nature seems very titillating. Does it not sound amusing that while we can have a precise mathematical description of a quantum system, nature forbids us to take a glimpse at it objectively? A quantum system also displays some scientifically bizarre behavior, which the physicists call in desperation "quantum weirdness."

Some recent example of such behavior has been spectacularly demonstrated in attempts to further substantiate Bell's theorem. When we measure the property of one

member of a quantum physically entangled system, the other member instantaneously responds defying cosmic speed limit, the velocity of light. One quantum particle always seems to react to what the other is doing even if an arbitrarily large distance separates them. This non-local nature of an entangled quantum system led the pioneering Physicist David Bohm to suggest a bold interpretation of quantum physics. According to Bohm, quantum physics indicates that behind our physical reality everything in this universe is interconnected at a fundamental level by an “unbroken wholeness” or an “intricate order” involving consciousness. Although Bohm’s idea of the connection between quantum physics and consciousness is far from being universally accepted, some very illustrious contemporary physicists share this view.

England’s Astronomer Royal, Martin Rees states in his book, *Before the Beginning*. “The paradox of quantum mechanics, and the nature of consciousness, are manifestly two of the deepest mysteries of all. It is striking that John Wheeler and Roger Penrose, the most original and influential living theorists about space and time, have both, in their later years, advocated the dissident view that these mysteries are linked.”

Robert Penrose, considered one of the greatest mathematicians alive, summarized his book, *The Emperor’s New Mind*, stating, “A universe governed by laws that do not allow consciousness is no universe at all.” John Wheeler, a colleague and confidant of Albert Einstein and Neil Bohr and the Ph. D. thesis advisor of Nobel Laureate Richard Feynman, propounds his rationale in a visceral way. He concurs with the Orthodox interpretation that in quantum mechanics, an objective reality does not exist until an observer performs the measurement of a quantum system. Therefore, Wheeler argues forcefully that the initial condition and the physical constants of the universe are dictated by the eventual emergence of “quantum mechanical observership.” In his recent book, *At Home in the Universe*, Wheeler emphasizes, “No reason has ever offered itself why certain of the constants and initial conditions have the values they do except that otherwise anything like observership as we know it would be impossible.”

The emergence of consciousness as a natural consequence of the unique features of our universe has become a topic of much scientific discussion known as the anthropic cosmological principle. This principle, stated another way, proposes that the laws of nature are precisely crafted; otherwise, intelligent beings like us would not have emerged to ask the question, why are these laws so accurate? Venerable Physicist Freeman Dyson, the one million dollar Templeton Prize winner, wittily remarks, “The universe knew we were coming.”

In fact, the ability of the human mind to understand the laws of nature has been an enigma to many eminent scientists. Einstein said, “The most incomprehensible fact about nature is that it is comprehensible.” Nobel Laureate Eugene Wigner, an ardent champion of consciousness as part of primary reality, referred to the “miracle of existence of laws of nature and the miracle of the capacity of the human mind to divine them.” It is rather curious that our prized objective knowledge of science is assembled through a subjective device—our consciousness. Would it not be ironic if we called the very window through which we perceive reality unreal?

The notion of some eminent scientists of our times that consciousness is an integral part of the scheme of this universe is not just metaphysics. Their conviction is firmly based on their careful scrutiny of the quantum nature of the ultimate reality. From this viewpoint, the primary realities of unified field and consciousness are inseparable

aspects of the same underlying process united through mutual participation. Since the quantum world of unbounded unified field pervades all manifest phenomena, so should consciousness. Here the implications of modern quantum physics parallel the cognitive knowledge of the spirit in various religious traditions.

According to them, consciousness is not an emergent property of matter that comes into existence only through the functioning of the human nervous system. Instead, consciousness is a characteristic of reality, a spirit pervading all manifestations. This unbounded field of nature's consciousness is not limited to an individual consciousness. Rather, the role of the human nervous system is to provide an appropriate material structure to individualize consciousness. In other words, we are the tuners of the all-pervading field of cosmic consciousness. So, we should be able to access the cosmic consciousness through our individual tuners. Our window of consciousness allows us intellectually to recognize that there is one common source; therefore, it should not be surprising if the same window would also allow us to experience the source. When we are in tune and experience the source, we feel blissful and inherently know what is the right thing to do.

Participatory Universe

John Wheeler further states in his book, "The observer is elevated from 'observer' to 'participator'. What philosophy suggested in times past, the central feature of quantum mechanics tells us today with impressive force: In some strange sense this is a participatory universe." Thus, reality is not complete without us as participating observers. If our participation in this universe is the ultimate purpose, it is necessarily inconsistent with the idea of renunciation, which at times has been popular in some monastic traditions.

The amazing similarity between the basic concept of God and some of the implications of modern quantum physics should now be evident. This concept has enriched the cultural heritage of the world through the millennia. Quantum physics have already made a very significant contribution to improve our physical life. Nearly thirty percent of the gross domestic product of USA today is based on the discoveries of quantum physics. But there is reason to believe that eventually the implication of quantum physics will make a more profound impact on the cultural and spiritual lives of all human beings.