The Meaning of Death

(No Entity has Pre-existing Values in the Physical world)

Sunil Thakur

Classical physics assumes that the things exist independently of an act of observation; however, quantum theory suggests that the apparent form of quantum system emerges as a consequence of an act of observation. However, quantum theory is silent on the state of the systems prior to the act of observation. It assumes that the wavefunction collapses as a consequence of an act of observation but does not explain the mechanism of the collapse of wavefunction. Therefore, it is at least incomplete, if not incorrect.

In this paper, we have shown that the apparent form of entities emerges as a consequence of an act of observation even in the macro world. We have shown that all the entities exist in non-physical form. The wavefunction of an entity is the sum of all the properties the entity may manifest in the physical world. The wavefunction remains unaffected by an act of observation. The apparent form of the observed entity depends as much on the observer as it does on the entity being observed.

We have also explained the scientific meaning of death.

Classical physics postulates that the things have pre-existing values i.e. objects have definite position and definite momentum. It is possible for us to measure any property of the object without disturbing any other property. Classical physics also assumes that an act of observation does not affect the entity being observed.

Heisenberg explains, *"In classical physics, science started from the belief or should one say from the illusion, that we could describe the world or at least parts of the world without any reference to ourselves. This is actually possible to a large extent. We know that the city of London exists*

whether we see it or not. It may be said that classical physics is just that idealization in which we can speak about parts of the world without any reference to ourselves. Its success has led to the general ideal of an objective description of the world. Objectivity has become the first criterion for the value of any scientific result." [1]

In the Copenhagen interpretation a particle exists in all its possible states at all possible places until it is observed. If observed, the system collapses into one of its possible states and manifests only at one place.

We are forced to present a long discussion of the subject and quote the eminent scientists extensively in the following passages because of the significance and complexities involved in the discussion.

Einstein could not dismiss quantum mechanics completely, but he did not accept the arguments of Copenhagen interpretation. Einstein argues that the theory does not say anything on the state of the observed entity in the absence of an act of observation. Einstein says that the silence of quantum mechanics on the state of the things prior to the act of observation indicates that quantum mechanics as incomplete, if not unrealistic.

Heisenberg explains that the quantum world is very different from the world of classical physics. Heisenberg explains, "*How could it be that the frequency of the orbital motion of the electron in the atom does not show up in the frequency of the emitted radiation? Does this mean that there is no orbital motion?*

But if the idea of orbital motion is incorrect, what happens to the electrons inside the atom? One can see the electrons move through a cloud chamber, and sometimes they are knocked out of an atom; why should they not also move within the atom? It is true that they might be at rest in the normal state of the atom, the state of lowest energy.

But there are many states of higher energy, where the electronic shell has an angular momentum. There the electrons cannot possibly be at rest. One could add a number of similar examples. Again and again one found that the attempt to describe atomic events in the traditional terms of physics led to contradictions." [2]

Warner Heisenberg claims, *"....in the experiments about atomic events we have to do with things and facts, with phenomena that are just as real as any phenomena in real life. But the atoms and elementary particles are not as real; they form a world of potentialities and possibilities rather than one of things and facts."* [3]

Almost ridiculing the Copenhagen interpretation, Schrodinger presents following thought experiment, "*One can even set up quite ridiculous cases. A cat is locked up in a steel chamber, along with the following device (which must be secured against direct interference by the cat): in a Geiger counter, there is a tiny bit of radioactive substance, so small, that perhaps in the course of the hour one of the atoms decays, but also, with equal probability, perhaps none; if it happens, the counter tube discharges and through a relay releases a hammer that shatters a small flask of hydrocyanic acid. If one has left this entire system to itself for an hour, one would say that the cat still lives if meanwhile no atom has decayed. The psi-function of the entire system would express this by having in it the living and dead cat (pardon the expression) mixed or smeared out in equal parts.*

It is typical of these cases that an indeterminacy originally restricted to the atomic domain becomes transformed into macroscopic indeterminacy, which can then be resolved by direct observation. That prevents us from so naively accepting as valid a 'blurred model' for representing reality. In itself, it would not embody anything unclear or contradictory. There is a difference between a shaky or out-of-focus photograph and a snapshot of clouds and fog banks."[4]

A cat is dead and alive simultaneously until someone observes it. There is no way we can know the state of the cat until we open the door. But we interfere with the experiment the moment we open the door.

Therefore, this assumption of quantum theory does not meet the criteria of the falsifiability.

Einstein was pleased Schrodinger's arguments. He writes in a letter to Schrodinger, *"You are the only contemporary physicist, besides Laue, who sees that one cannot get around the assumption of reality, if only one is honest. Most of them simply do not see what sort of risky game they are playing with reality—reality as something independent of what is experimentally established. Their interpretation is, however, refuted most elegantly by your system of radioactive atom +*

amplifier + charge of gun powder + cat in a box, in which the psi-function of the system contains both the cat alive and blown to bits. Nobody really doubts that the presence or absence of the cat is something independent of the act of observation." [5]

Heisenberg is not concerned. Heisenberg claims that the mental block is preventing classical physicists from accepting the new reality. Heisenberg says, *"…….in the Copenhagen interpretation of quantum theory we can indeed proceed without mentioning ourselves as individuals, but we cannot disregard the fact that natural science is formed by men. Natural science does not simply describe and explain nature; it is a part of the interplay between nature and ourselves; it describes nature as exposed to our method of questioning. This was a possibility of which Descartes could not have thought, but it makes the sharp separation between the world and the I impossible. If one follows the great difficulty which even eminent scientists like Einstein had in understanding and accepting the Copenhagen interpretation of quantum theory, one can trace the roots of this difficulty to the Cartesian partition. This partition has penetrated deeply into the human mind during the three centuries following Descartes and it will take a long time for it to be replaced by a really different attitude toward the problem of reality."*[6]

Neils Bohr argues, *"There is no quantum world. There is only an abstract quantum mechanical description. It is wrong to think that the task of physics is to find out how things are. Physics concerns what we can say about nature."* [7]

Neils Bohr's argument is that it is not the job of physics to explain why things are the way they are. A physicist can only describe the things as they are revealed to him.

We think that it is the responsibility of the science to explain why things are the way they are. In the absence of the explanation of the reality of the observed phenomena, science would just be another form of mysticism. Copenhagen interpretation is incomplete not just because it is silent on the issue of the state of the things prior to an act of observation but it also fails to explain the mechanism of the collapse of the wavefunction.

Abraham Pais narrates following conversation with Einstein, "*In 1950 while accompanying Einstein on a walk from Princeton University to his home, Einstein 'suddenly stopped, turned to me, and asked me if I really believed that the moon exists only if I look at it.'* [8]

One may disagree with the interpretation of the phenomena we observe in the quantum world, but we cannot disagree with quantum theory's description of how things are in the quantum world, but we cannot say the same thing about the macro world.

It may not be easy to find out the real states of the things prior to an act of observation, but we may at least try.

In this paper, we have resolved all the issues related to the reality of the physical world.

Results

This paper resolves the measurement problem.

This paper shows that for every observer, the things actually are the way they appear to him at the time of observation. We have shown that the apparent form of the observed entity is the actual form of that entity for the observer.

We have shown that the apparent form of all entities, from the smallest system to the largest system, is only a projection of a non-physical entity.

We live in a non-physical world.

This paper shows that no entity has pre-existing values in the physical world.

This paper explains the meaning of death. The cat exists as a non-physical entity; therefore, death can only mean the loss of potentiality to manifest as a physical system. It also loses the potentiality to communicate and function as a system in the physical world. The non-physical entity loses the potentiality to manifest mass. In non-physical form, an entity is neither alive nor dead. These terms are meaningful only in the physical world, not in the non-physical world.

Methods

Quantum mechanics suggests that quantum world is not real. In the quantum world, a system manifests only as a consequence of an act of observation. This claim of the quantum mechanics is so counterintuitive that no one has even explored the possibility that this observation may apply even to the macro world.

We will examine the macro world to see if the entities like a galaxy, a star, or even an atom has any predetermined values.

The merger of galaxies has to be the most amazing phenomenon of the physical world because even a bird hit can cause substantial damage to an aircraft, but the merger of galaxies does not cause much damage to the galaxies.

The collision of massive objects such as galaxies moving at velocities close to or even greater than the velocity of light must annihilate the colliding galaxies and cause massive destruction in the nearby regions as well. However, the merger of galaxies is a remarkably smooth process.

Two galaxies are attracted towards each other. They meet and lovingly embrace each other. The stars make way to allow the black holes to merge. In turn, the black holes promise not to swallow any star on their way. The black holes shake hands and disappear into each other. Finally, the stars rearrange themselves, and everyone lives happily thereafter.

What a lovely fairytale it is! No fiction can match this love story.

If galaxies exist physically even in the absence of an act of observation then, there is no way galaxies can merge with each other without destroying each other.

The merger of galaxies is a physical impossibility unless the galaxies merge in non-physical form.

In our article, *'The mechanics of Perception'*, we have shown that the time an observer perceives an event is the actual time of the event for that observer.

In the paper referred above, we have also shown that we perceive the information generated by a physical entity, not the physical entity. The entity can generate the information only if it exists even before an act of observation.

We have also shown that the apparent form of the entities is only a combination of the properties of the entity and the observer.

We do not perceive the Moon. The apparent form of the Moon is only a projection. The apparent form may change just because the observer does not have 6/6 vision.

In the supplementary file of this paper, we have analyzed the mechanism of total solar eclipse to show that the apparent position of the objects is their actual position for every observer.

Considering the significance of the observations, we will reproduce it here, *"Light takes 8 minutes 44 seconds to reach earth from the sun and it takes about 1 second for the light to reach earth from the moon. Sun moves about 2.18 degrees (15 degrees in one hour) in 8 min. 44 seconds and moon moves about 0.0006 degree in 1 second in the sky. Since we are supposed to see the sun only when our eyes can absorb the photons emitted by the sun, its apparent position is 2.18 degrees below its actual position.*

It means the actual position of the Sun and the Moon are not in a straight line when their apparent position appears to be in a straight line. Therefore, the Moon cannot block the photons emitted by the Sun when the Sun, Moon, and Earth appear to be in a straight line.

We shall also remember that in 8 minutes 45 seconds, the moon moves 0.0073 degree (about 525 KMs) in its orbit and earth moves 0.0055 degree (about 15000 KMs) in its orbit in 8 min. 45 seconds. Therefore, the photons emitted by the Sun when its actual or even apparent position is in a straight line with the Moon and the Earth would miss the Moon by a long distance." [9]

Given the fact that the total solar eclipse does occur when the apparent positions of the Sun and Moon are in a straight line with the Earth, we have no option but to conclude that the apparent positions of the Sun and Moon are their actual position and that for every observer, the things are the way they appear to him at the time of observation. Therefore, even the apparent properties of the entity are the actual properties of that entity for that observer.

Even if we say the apparent position and apparent properties of the Sun are the actual positions of the Sun and Moon for the observer then also we cannot deny that the Sun actually exists at one place. However, if we assume that the actual Sun exists at a place other than its apparent position, we must assume that the light will originate from the actual position of the Sun, but we can explain the occurrence of total solar eclipse only if the light originates from the apparent position of the Sun. Therefore, for all practical purposes, the actual position of the Sun and Moon are their actual position.

The actual position is significant only if we do not introduce any observer. In this position, the Sun exists in non-physical form without manifesting any of its properties in the physical world.

The Sun manifests in the physical form only as a consequence of an act of observation. Therefore, its apparent form is its actual form for every observer.

The apparent position and apparent properties of the Sun and the Moon are affected by a number of factors; for example, the distance of the observer from these entities, angle of refraction (if any), the method of observation, and properties of the observer. Therefore, the Sun may appear in different forms and at different places to different observers.

Since the apparent form of the Sun and the place at which it manifests are real for every observer; therefore, we can say that the apparent form of the Sun, Moon, and all other physical entities exist in superposition.

We have an observer-independent entity called the Sun that has certain properties it has the potentiality to manifest in the physical world. This entity exists in non-physical form. It does not exist in superposition.

Of course, these observations apply to all the entities we observe in the physical world.

The apparent form of galaxies is also just a projection. The galaxies exist and merge as non-physical entities and manifest in the physical form only as a consequence of an act of observation.

If galaxies do not exist in physical form then, even stars cannot exist in physical form.

Let us find out if stars exist in physical form.

In our paper on the *'Mechanics of Perception'* we have analyzed a movie recorded by the MIT team and the mechanism of the total solar eclipse to show that for every observer, the time and place at which an observer perceives an event are the actual time and place of that event.

We have shown that we can explain the mechanism of total solar eclipse only if we treat the apparent positions of the Sun and Moon as their actual positions.

Heisenberg's observation on the absence of the frequency of the orbital motion of the electron in the frequency of the emitted radiation highlights a very mysterious feature of the quantum world.

Let us visualize the process that may lead to the creation of atoms.

The constituents of protons and neutrons must be present at the right time at the right place along with the electrons. The force particles must intervene at the right time to allow the particles to form a bond.

This process must occur at trillions of places in the universe simultaneously to create all the atoms of even one element and repeat itself over a hundred times to create different elements.

We ought to remember that these particles are produced in their respective fields. Quantum mechanics suggests that at least, 58 fields exist in a state of superposition.

We are expecting too many coincidences to happen too frequently at too many places to create atoms of different elements.

If nature were to rely on the chance to manage this universe then, the universe could not have had any fundamental laws. Fortunately, nature manages the universe through some simple fundamental laws, not through chance events occurring from time to time.

The frequency of the electron does not disappear mysteriously when we observe the atom nor does the atom disappear in thin air when we observe an electron. It is just that the method of observation selected by us has its own limitations; it cannot respond to the entire range of frequencies in which an entity emits radiation.

No such thing as an atom exists in any physical form or shape. At a particular point of time, the universe acquired the potentiality to manifest its sub-systems called atoms of a particular element in physical form. At another time it acquired the potentiality to manifest another set of atoms of a different element.

The atoms too exist only as a non-physical entity and manifest only as a consequence of an act of observation.

If we observe a part then, the part manifests and if we observe the whole then, the whole manifests. For example, in the analysis of the concept of space, we have highlighted chemistry's observation that ice has several groups of water molecules separated by empty space. However, electromagnetic waves and sound waves move at a uniform velocity in the ice slabs. It means that the ice has a uniform structure without any empty space in it.

Once again, we find that if we examine parts then we find groups of water molecules and empty space, but if we use another method of observing the structure of ice then, it behaves as if it is a uniform structure.

We have explained the mechanism of manifestation of the physical entities in the physical world in our paper, *'The Mechanics of Perception'*.

"An entity may have 'n' number of properties that it can manifest in physical form, but the observer also must have the potentiality to manifest these properties in physical form. One observer may manifest one set of properties and other observer may manifest another set of properties of the same entity simultaneously. In some cases, these properties may even be mutually exclusive." [10]

Now, let us examine the cat-paradox.

The alive and dead states are physical manifestations; therefore, these terms are meaningful only in the physical world. In reality, the cat itself is only a physical manifestation of a non-physical entity. The wavefunction of the non-physical entity is the sum of all the properties it has potentiality to manifest in the physical form.

The non-physical entity must acquire the potentiality to manifest a property before it can manifest it in the physical form. Therefore, the cat cannot manifest in the dead state until it dies. However, once it dies, it may manifest in both these states simultaneously to different observers or even to the same observer provided observer uses two different methods of observation.

Copenhagen interpretation does not state that a particle exists in non-physical form until it is observed. We can say that Copenhagen interpretation assumes that the particles do not exist in any form whatsoever until they are observed. A particle is neither here nor there and it is here as

well as there until it is observed. We can only calculate the possibility of finding it at any particular place.

However, the analysis of the total solar eclipse and even of the movie recorded by the MIT team clearly shows that most events in the macro world are predictable.

It is true that at least as of now, we cannot predict the time a radioactive atom may decay; therefore, we cannot be sure whether we would find the cat in alive or dead state when we open the box after an hour.

However, it the act of observation or absence of it does not affect the state of the non-physical entity that manifests in the form of a cat.

The physical form manifests only as a consequence of an act of observation; therefore, for the observer the state of the cat he discovers by observing it, is the actual state of the cat at that particular moment.

An act of observation simply presents a snapshot of the things as they are at the time of observation.

If this is so, then what is the significance of the death?

A human being is a system; a dead body is an object.

The cat ceases to communicate and function as a physical system once it dies. Therefore, it cannot have any causal effects on the events in the physical world by performing any physical act.

Since the cat exists as a non-physical entity; therefore, death can only mean the loss of potentiality to manifest as a physical system. It also loses the potentiality to communicate and function as a system in the physical world. The non-physical entity loses the potentiality to manifest mass.

The cat may still appear to be alive, which means it may still manifest as a functional physical system to an observer, but only because of the time delay in the communication of information. For example, if a cat is located at a distance of 10 feet from an ultrafast camera. Suppose the cat

dies at 5 nanoseconds past 00.00 hrs. In the frame of this camera, the cat will be alive until 15 nanoseconds past 00.00 hrs. The state of the apparent form of the cat would be the actual state of the cat for the camera.

At the same time, the cat would manifest in dead state at 5 nanoseconds past 00.00 hrs. to an observer located in the same frame. The dead state would be the actual state of the cat for this observer.

Can we say that the cat exists in both the states simultaneously because both the states would be the actual state of the cat for the observers?

Or, we can only say that the cat exists in only one state but may manifest in both the states?

The physical form is only a manifestation of a non-physical entity. It emerges only as a consequence of an act of observation. Therefore, we cannot say that the cat exists in both the states simultaneously. In the non-physical form, it is neither alive nor dead because these terms are meaningless in the non-physical world.

Let us find out what happens to the non-physical form of the cat after the cat dies.

The death does not destroy the information associated with the entity. Since the entity exists in non-physical form; therefore, the death cannot destroy neither the entity nor the information associated with it.

Therefore, the non-physical entity that appeared in the form of a cat in the physical world continues to exist even after its death.

We can even explain the ultimate fate of the cat scientifically, but for that we will have to discuss some other important features of a system. Therefore, we will explain the ultimate fate of the cat in another article.

Discussion

John Bell observes, *"Making a virtue of necessity, and influenced by positivistic instrumentalist philosophies, many come to hold not only that it is difficult to find a coherent picture but that it is wrong to look for one – if not actually immoral then certainly unprofessional. Going further still,*

some asserted that atomic and sub-atomic particles do not have any definite properties in advance of observation. There is nothing, that is to say, in the particles approaching the magnet, to distinguish those subsequently deflected up from those subsequently deflected down. Indeed even the particles are not really there." [11]

We have no option but to have a coherent picture because the universe functions as an indivisible whole. The universe is a system. At the same time it may not be wrong to say that there is nothing, that is to say, *in the particles approaching the magnet, to distinguish those subsequently deflected up from those subsequently deflected down, but it definitely does not mean that even the particles are not really there.*

These days the debate on the shape of the Earth is heating up despite the fact that overwhelming evidences indisputably show that the Earth is an oblate spheroid, but some people claim that the Earth is flat. If we examine the evidences presented by these people then we are forced to accept that some of these evidences are as compelling as any evidence which shows that the Earth is an oblate spheroid.

The fact is that the Earth is neither an oblate spheroid nor flat. The Earth exists in a non-physical form. It does not have any inherent physical shape; therefore, it can manifest in mutually exclusive shapes depending on the method of observation.

In fact, the analysis of the structure of the universe also presents contrasting evidences about its shape. The universe is neither flat nor spherical. It assumes a form only as a consequence of an act of observation. The method of observation determines the shape of its apparent form.

Heisenberg says that we do not observe nature, but nature exposed to our method of questioning. Einstein felt that *the (quantum) theory had abdicated the historical task of natural science to provide knowledge of significant aspects of nature that are independent of observers or their observations.* [12]

Neither of them presents a real description of the physical world. Nature definitely is not the sum of all the physical or even non-physical entities. Nature is the sum of all the laws that govern the physical world.

These laws are observer independent.

Quantum mechanics is not only incomplete but partially wrong even in its description of what it observes. Einstein and all other physicists who believed that we can describe the world independently of the observers are nowhere close to explaining the nature of even physical reality. Copenhagen interpretation does present an out-of-focus blurred image of reality, but it is still closer to the truth.

This paper along with our paper, '*The Mechanics of Perception*' presents a simple and real interpretation of the quantum world. None of the observation is based on any assumption, and we have not relied on any thought experiments.

All the observations are backed up by indisputable evidences.

Isn't it strange that we do not even know that we are a non-physical entity that assumes physical form only as a consequence of an act of observation?

Think about it!

These findings open up a whole new world to every human being in general and scientists in particular. We cannot even imagine what all is possible in this universe. In fact, it will not be an overstatement if we say that nothing is impossible in the physical world.

****

1. *Werner Heisenberg, Physics and Philosophy: The Revolution in Modern Science, Harper & Row Publishers, Inc., New York, New York 1962*
2. *Werner Heisenberg, Physics and Philosophy: The Revolution in Modern Science, Harper & Row Publishers, Inc., New York, New York 1962*
3. *Werner Heisenberg, Physics and Philosophy: The Revolution in Modern Science, Harper & Row Publishers, Inc., New York, New York 1962*
4. *Erwin Schrödinger, Die gegenwärtige Situation in der Quantenmechanik (The present situation in quantum mechanics), Naturwissenschaften*
   (translated by John D. Trimmer in Proceedings of the American Philosophical Society)

5. *Maxwell, Nicholas (1 January 1993). "Induction and Scientific Realism: Einstein versus van Fraassen Part Three: Einstein, Aim-Oriented Empiricism and the Discovery of Special and General Relativity". The British Journal for the Philosophy of Science. 44(2): 275305. doi:10.1093/bjps/44.2.275. JSTOR 687649.*
6. *Werner Heisenberg, Physics and Philosophy: The Revolution in Modern Science, Harper & Row Publishers, Inc., New York, New York 1962*
7. Paul. McEvoy, *Niels Bohr: Reflections on Subject and Object* (2001)
8. A. Pais, *"Subtle is the Lord…" The Science and the Life of Albert Einstein*, Oxford U.P., New York (1982) p. 456. , Google Scholar
9. *Sunil Thakur,*
10. *Sunil Thakur,*
11. *John Bell, 'Speakable and Unspeakable in Quantum Mechanics'*, The Press Syndicate of the University of Cambridge, 1989.
12. Stanford Encyclopedia of Philosophy, The Einstein-Podolsky-Rosen Argument in Quantum Theory https://plato.stanford.edu/entries/qt-epr/