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Contradictions Between Quantum Mechanics and Conventional Physics Laws of Nature

All of the actual laws of nature can be considered to be one large system that controls all processes in our universe. Science is a means of discovering what some of these universal laws might be. For each law in this universal system that is posited or discovered, the question arises as to its truthfulness or falsity. One approach would be to compare different posited laws with each other and observe whether or not they contradict each other and under what circumstances. One area where many contradictions exist can be observed when comparing the quantum mechanics and conventional physics laws of nature. This essay briefly examines the possibility that some posited laws in quantum mechanics might be false when comparing to conventional physics with further study of experimental evidence and deeper analyses.

Introduction:

My main scientific interest is our universe and how it works. In our evolution as intelligent humans we have developed scientific methods for studying and observing our universe. Specifically, science, over time, has posited a growing system of laws that describe processes involving the interactions of matter, forces, energy and time that make up the stuff of our universe and of our existence.

The combined system of laws is large and doesn't seem directly amenable to treatment by elementary means such as Godel's theorems of incompleteness. Logic and other methods will have to suffice. However, the goal is still to find incompatible and contradictory laws so that truthfulness could be sought with false laws to be thrown out. I want to suggest that quantum mechanics has developed a set of laws that directly conflict with the laws of conventional physics. Quantum physics claims that these opposing laws of nature are necessary or justified based on experimental results. My thesis in this essay is to suggest that all experimental test results that supposedly support quantum mechanics can actually be explained using conventional physics.

In this essay, I can only summarize a few major conflicting laws of nature. I will discuss these further in the body of the essay, suggesting that it is quantum mechanics that has posited flawed laws:

1. The state of objects defined by position, linear momentum and spin as defined by conventional physics and quantum mechanics are in complete opposition with no logical or scientific transition between one set of laws and the other. The heart of the quantum mechanical definition of, say, position, is that position doesn't exist in real time and real space. How can objects larger than quantum particles exist if the building blocks of these objects don't fully exist? Conventional physics claims that every object in our universe does have a real position, a real linear momentum and a pure net spin about a fixed axis of rotation in space. There's no explanation of how one set of laws transitions into the other set of laws.

The quantum mechanics definition was the only definition of position that quantum physicists claimed could account for wave-like behavior of particles as depicted, for example, in the two-slit diffraction patterns observed. And yet, the same two-slit diffraction patterns were also observed by firing only one particle at a time at the double-slits. Conventional physics suggests that the quantum particle itself has an internal wave like structure that interacts with itself in the process of passing into and around the bar between the two slits before coming back together on the other side.

2. A different set of probability laws and definitions are used in conventional physics than are used in quantum mechanics. In conventional physics, probabilities can be assigned to events or outcomes of similar repeated experiments that are random in nature. For example, the measurement of the length of steel rods manufactured repetitively by a given machine would be random due to variation in the manufacturing process itself and/or due to error in the measurement apparatus itself. Every rod, however, would still have a real existing length whether it's measured or not. The entire population of rod lengths would follow some probability density distribution.

Quantum mechanics, on the other hand, defines a quantum particle's position, for example, as a superposition of probabilities where the particle itself has no real position at any given time. The only time that a particle has a real position is if the particle's position is measured in some fashion. Probabilities of the outcomes of position measurements for real existing objects contradicts quantum mechanics' assumption that the positions are in a superposition of probabilities state and that real positions do not exist.

3. The laws governing the spin (angular momentum) of objects in conventional physics and quantum mechanics also contradict each other. In conventional physics, all objects, including quantum particles, have a fixed spin about a fixed axis of rotation in space. Quantum mechanics, however, assumes that a real physical spin does not exist for quantum particles. It's assumed that spin is composed of the superposition of probabilities as in the case of position and linear momentum.

Experiments involving spin measurements on twin particles that supposedly confirm the quantum mechanics laws turn out to also confirm the conventional physics laws.

Real Quantum Particle Model - Further Discussion:

I pose the following question: Is it at all possible that the Copenhagen Interpretation could actually be scientifically wrong? I've been an engineer and scientist for 45 years, spending the last 15 years researching the field of quantum mechanics. My general conclusion and opinion is that the laboratory test data and analyses that supposedly support the Copenhagen Interpretation have been misinterpreted or misapplied and that the data in question can also support a real particle model that has no physically attached probability or wave function. One of the main arguments against the Copenhagen Interpretation is that probability functions can never be real objects: they can only predict possible outcomes of *future events*. One extension of the Copenhagen Interpretation is to posit that every quantum particle is what is called a "qubit," which means that the spin (angular momentum, polarization) of a particle is always in a probabilistic state and is not physically real. It's the probabilities that are assumed to be real. I posit that a real particle that might exist could be in what is called a "pure spin" mode, like a spinning soccer ball. The pure spin mode is not a qubit nor a hidden variable model. It can be shown that assuming the "pure spin" mode actually confirms *all* of the twin particle test data ever generated. There is no need for an attached superposition of probabilities as assumed in defining the qubit in quantum mechanics.

Results from an extensive study in developing a real model of quantum particles (Ref, [1-7]). show that every particle is real and has a real position located at its center, a real linear momentum located at its center and a real angular momentum about a fixed axis in space that passes through its center. This makes it a real object, like an asteroid or a soccer ball.

A real model contrasts with the currently accepted quantum mechanics model, which is not real: the Copenhagen Interpretation model. I pose this general question: Is it possible that the Copenhagen Interpretation could actually be scientifically wrong? If this is even a remote possibility, it should be seriously reconsidered.

At its cruz, the Copenhagen Interpretation is based primarily on assuming that a *probability density function*, derived from what is called a particle's *wave function*, can exist as a real time object and that this object can be physically attached to and travel with a particle in real time, even though it has never been physically detected. As I understand it, the particle wave function assumed in the Copenhagen Interpretation is inherently a probability distribution function and not any actual wave. In all conventional scientific fields other than quantum mechanics, probabilities are never real objects in the present ([8] A. Papoulis). This includes both the assumed quantum probabilities as well as other types of probabilities as listed in [9] (*Stanford Encyclopedia of Philosophy*, Chapter on "Interpretations of Probability"). All probabilities can only predict possible *future* outcomes of *events* including property measurements.They can never be real or *attached* to physically real objects. Here is the heart of my argument against the validity of the Copenhagen Interpretation as a model of actual quantum particles: That probabilities can never be real in the present so that the wave function itself can never be real.

The wave properties of a real particle then would all have to be contained within the internal wave structure of the particle itself.

As a preliminary example, assume that a real particle angular momentum (spin, polarization) as being fixed about a single axis of rotation that is itself directionally fixed in space, like a spinning soccer ball. This is referred to as a "pure spin" model which is "real" and is not a "qubit" nor a "hidden variable" model. It is shown in the references listed that twin particles in the "pure spin" state with oppositely oriented axes of rotation fixed in space satisfy *all of the twin particle test data ever measured*. For example, measuring the angular momentum of both twin particles about the same *arbitrarily* chosen measurement axis always yields a match of opposite orientation, no matter how far apart the particles may be. There is no "entanglement" here, only real properties. Pure spin particles are not "qubits" nor "hidden variable" models.

This essay suggests that all of nature down to the smallest objects, such as quantum particles, involve *real* objects and that all of the laws of nature within our universe lead to *real* processes and *events* that follow cause-and-effect principles based on those laws. Unfortunately, the quantum mechanics models that are generally accepted today are *not real* and lead to the acceptance of magic-like phenomena that can not possibly exist.

Consider the possibility that quantum particles actually exist as real discernible objects and that these objects contain an *internal* wave-like structure that basically follow the De Broglie relations on average ([10] J.R. Taylor, et al, Section 6.2: De Broglie's Hypothesis). Consider that the waves within this particle structure are in dynamic motion with randomly distributed locations and peak sizes that extend outward from the center of the particle, like random spikes on an average shaped sphere. These spikes may extend far out. It is the interaction of these spikes with other foreign particles, objects and/or forces that result in both point-like and wave-like probabilistic outcomes and behaviors that have been observed, including the two-slit diffraction patterns. The particle itself exists as a physically real entity with no need of any non-real magical behavior that is inherent in the Copenhagen Interpretation.

It's interesting to note that the diffraction patterns observed in the laboratory for both photons and matter particles show up even when only *one particle* passes through the double-slits at a time. Also, the distance between the slits must be of the same order of magnitude as the size of the particle itself. It's logical to assume that the single particle itself might interact with the double-slit directly causing changes in the post particle's direction that results in the diffraction patterns.

A recent book by Adam Becker ([11] *What Is Real?*, (2018)), examines the possibility that the Copenhagen Interpretation is not real and cannot exist. There are a number of quantum physicists who are considering other models to replace the Copenhagen Interpretation. Besides this book by Becker, there was one of the most renowned physicists in history, Einstein, who spent over three decades refuting the Copenhagen Interpretation. His main objections to this model included its lack of causality explanations or proofs and its lack of completeness in describing the entire state of real quantum particles. To Einstein, this model just didn't "smell right."

Copenhagen Interpretation Model:

The Copenhagen Interpretation model can't possibly represent reality primarily because it is based on accepting probabilities and probability distributions as if these can exist as real objects in real time and in real space. It is generally accepted in most other fields of science and applied mathematics that probabilities are not real in the present but can only predict the possible outcomes of "future events or experiments," such as "measurements." Probabilities themselves can represent averages of repeated events that can occur only in the "future" ([8] A. Papoulis). Max Born's positing that a physically real "probability wave function," $\psi(x)$, can be attached to every single quantum particle in real time has to be wrong.

Born's so-called "wave function" was not objectively derived from basic principles or established laws of nature ([10] J.R. Taylor, et al, Section 6.4: The Quantum Wave Function). There was no cause-effect derivation used to prove that the "wave function" physically existed and that such a function can be attached to every individual quantum particle. No! … Born basically *postulated* the wave function by *analogy* with classical wave functions and with *field theories* such as the electric field strength for an *ensemble of many particles*. It appears that Born lifted the "field strength" wave function definition intended for an ensemble and redefined it by the same term "wave function" and applied it to a *single* quantum particle. Based on the analogy to the electric field strength, Born and Neils Bohr then defined the particle wave function probability density, f(x), in terms of its wave function $\psi(x)$ as: $f(x) = |\psi(x)|^2$, where f(x)dx was defined by them as representing the probability of "finding the particle at x" if the position could actually be measured at different fixed moments in time. Prior to any measurement, the particle's position would just not exist! It would actually exist only as a "probability," entirely contradicting the basic foundational postulates of applied probability theory and classical mechanics.

So, according to Born and Bohr, a quantum particle exists or travels through space having no real position (nor momentum) while at the same time, mysteriously having a "wave function" attached to it. First of all, on the surface, this seems to explain the fact that a probability density like f(x) is often observed for the *position measurements* of an ensemble of many similar particles. I think that it's the interaction of a particle's internal wave-like structure with the measurement apparatus itself that is the cause of the random outcomes observed. Prior to measurement, a real particle has a real fixed position located at its center.

Second, the attached "wave function" supposedly causes it to behave as a "wave" in certain interactions with the outside world. This would seem to explain the diffraction patterns observed in the "two-slit" experiments for both photons and matter particles. Bohr claims that there is no other model that can explain these experiments. Of course, I disagree. As I see it, because the "wave function" seems to explain the two-slit diffraction patterns, Born and Bohr assume that the "wave function" is actually real and that every quantum particle has one attached to itself! Apparently, they never seriously looked at other possible mechanisms that would explain the probabilistic position measurements and the diffraction patterns.

Recommendation:

I would like to recommend that FQXi initiate a funded forum to reexamine conventional physics and quantum mechanics laws of nature.

References:

Over the past eight years, I have written and submitted five separate articles and letters to the American Physical Society, the Institute of Physics and to FQXi as well as having presented a summary of my work at the APS Meeting in Denver on 3-7 March 2014. Also, I have summarized some arguments and proofs against the possible physical existence of quantum entanglement in a booklet entitled "The Quantum Entanglement Delusion." Copies of this booklet have been provided to 33 physicists and scientists, most of whom are members of the American Physical Society. None of these individuals has refuted or rebutted any of the arguments posited that conclude the non-existence of quantum entanglement, the qubit, or simultaneous multiple paths.

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