Why did Nature need Quantum Mechanics at all?

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Abstract

It is instrumental interpretation of Quantum Mechanics. Why this new interpretation is needed? Because all known interpretations only describe how Quantum Mechanics works, so that one can be able to apply equations, but do not answer the question: "why did nature need Quantum Mechanics at all?"

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Why is another interpretation needed? Because all known interpretations only describe how Quantum Mechanics works, so that one can be able to apply equations, but do not answer the question: "why did nature need Quantum Mechanics at all?" In other words: "can there be a universe in the Multiverse that does not have Quantum Mechanics?" Notes to this are in the Appendix.

Nature is what instruments measure. For example, Albert Einstein answered the question "what is time?" that this is what the clock shows. The clock is showing with a fundamentally measurement error (uncertainty range). For example, you cannot say strictly scientifically that it is 2 P.M. now, but you can say "2 P.M. plus or minus 5 minutes". The error is unavoidable, because the devices themselves change nature in an uncontrolled way, while measuring it. For example, when measuring blood pressure, the cuff presses on the arm, agitating the patient. Therefore, it follows from this definition that nature itself (and not only our measurement methods) is characterized by Heisenberg's uncertainty – measurement error.

Note that I spoke about the devices (instruments), but did not say a word about who is using them – the Observer. There is no need to mention the Observer. We don't have to go everywhere with a ruler and a thermometer to measure nature. Nature can be measured in principle.

The whole point is in the definition. One agrees, that the device affects nature, but one does not include the device into the definition of nature. I included it in the definition of nature. Reality is built on definitions, because there are three laws of Aristotle's logic (according to the first law, everything must have a definition). I propose to define nature as what the device measures. Our brain also subconsciously measures, but produces inaccurate, rough measurements that do not have a scientific form. Otherwise, we would not be able to move among the obstacles.

And there is no other explanation why nature needs Quantum Mechanics. Therefore, you need to have a goal: to find it possible to accept my article, and not to reject it.

I. DISCUSSION

In recent years the wisdom of experiments has reached such high level, that some interpretations of Quantum Mechanics are getting falsified [3]. Therefore, I suggest a new interpretation of Nature to compensate the loss of these interpretations.

The size matters

Indeed, the smaller the object of Nature, the stronger it is modified by measurements. Thus, the bigger the object, the less it is "quantum". Indeed, bullets in the double-slit target are not producing wave-like interference pattern, even if their flights are not observed.

How about the semi-dead cat?

Schrödinger's cat is placed in a box, an Uranium atom decays and triggers a Geiger counter. The latter breaks an ampoule with poison and the cat dies. Scientists say that if we do not open the box, the cat is in a limbo state between life and death, called "quantum superposition".

But why such a tornament? Do not put the poison into the box! Do not take a box! Forget about any poison! Do not use the poison at all! Take only Uranium and a Geiger counter and a human to watch the detector. Let a human watch the detector until it would react, giving a sound to the radiation detection. The question arises: why the superposition (decayed – not decayed) is not destroyed inside the Uranium, during all the time until the detector reacts? If the radioactive material decays, the Geiger counter will work with a probability of less than 100 percent [2]. Due to the fact that the counter is not determined to react, the superposition (decayed – not decayed) inside the radioactive substance is not disturbed by the observations of the person. Only in case of a reaction of the Geiger counter, the superposition inside the radioactive substance would be broken.

Can a particle be in two places simultaniously?

In overall situations, superposition is not measured by instruments, therefore superposition is not a part of Nature (look my definition of Nature above). And if so, the logic of Aristotle (White is not Black and Black is not White) is not violated.

Spooky action

Was it groundless panic of Einstein to call the entanglement the spooky action or he was genius enough to fear it?

A particle CCC is a particle, which has either spin +1 or spin -1. A particle VVV is a particle, which has a quantum superposition between spins +1 and -1 (it is like the Schrödinger's dead-alive cat).

The source fires in opposite directions the entangled particles A and B. After crossing one meter to the left the particle A gets measured, its spin happens to be +1. Thus, after crossing one meter to the right (from the source) the particle B can show only spin -1, in case it gets ever measured. The spin -1 of B could be measured, e.g. at 5 meters from the source, or 10 meters from the source. The available spectrum of results is indifferent: -1.

Thus, after the one-meter flight from the source, the particle B changes itself from being VVV to being CCC. But elementary particles (like particle B) must be VVV because they satisfy the equations of Quantum Mechanics. What equations then the elementary particle B satisfies if it remains CCC forever?

In Einstein's Relativity there is no Newton's Absolute Reference Frame, and holds the speed limit $v < c$. This means all frames are equivalent: no Newton's Absolute Time. But we have infinite fast propagation of the entanglement effect: if A is measured at one meter from the source, then the B loses superposition between own spins (+1,-1) exactly at one meter from the source. Thus, we must include Newton's absolute space-time into the theory. Otherwise, we have no definite law, that connects two entangled particles: A on Earth, and B on Mars, because in Einstein's theory the simultaneousy is relative.

Such inclusion of Absolute Reference Frame does not violate the mathematics of the Einstein's Theory, because it is not the real "Absolute" Reference frame, but only the Special Frame, the frame with special additional rules.

II. APPENDIX

Note 1. Different laws of the Multiverse.

Is this metaphysics or philosophy? Many people recognize among scientists that there are parallel worlds (whole universes), where the laws of nature are different. Is there a world in which there are no laws of Quantum Mechanics?

There are also such worlds that did not originate from Everett's many-worlds interpretation, but from String Theory. There, each "(mem)brane" of it is a separate universe. String Theory is still a hypothesis, but it is popular and widely accepted as the only promising project for Theory of Everything and Quantum Gravity. Therefore, I say for sure: the laws in a parallel world can be completely different from our laws. Scientists say that it explains the fine-tuning of fundamental constants. Setting up constants implies different options for the values of constants, and different constants point to different laws and different worlds, respectively.

Note 2. David Bohm's theory was intended to show that all quantum effects occur not because nature is quantum, but because we cannot accurately measure it. David Bohm's theory is untenable because:

1. Although he considers particles to be classical, he introduces an additional field, a new fundamental interaction, which we have not identified in experiments.

2. Contradicts experiments on verification of Bell's inequalities, and does not describe photons.

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[2] Alain Aspect, Jean Dalibard, Gérard Roger, Experimental Test of Bell's Inequalities Using Time-Varying Analyzers, Phys. Rev. Lett. 49, 1804–1807 (1982).

[3] M. Ringbauer, B. Duffus, C. Branciard, E. G. Cavalcanti, A.G. White, A. Fedrizzi, Measurements on the reality of the wavefunction, Nature Physics **11**, 249–254 (2015)