On the Interpretation of Quantum Mechanics (2)

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Abstract:

Bohr's ideas about quanta were not justified. This is being demonstrated by Bell-test experiments.

When a needle is placed vertically on a horizontal glass table it will eventually fall in an arbitrary direction. No theory, not even General Relativity Theory or any other theory, can predict the direction in which it will fall into. And it is even worse: as long as the needle doesn't move, it is not possible to know, just by looking at it, if the needle is fixed to the table in a way that it will not fall even with the force of ten horses or that it will fall just by the force of a colliding molecule. Also the trajectories of molecules in a container are not to know. This is the reality. No one has any problems with that.

But as Quantum Mechanics is concerned problems seem to arise. Bohr stated that Quantum Mechanics is a complete theory although it can not predict properties of particles (quanta). In Quantum Mechanics wave functions occur which are supposed to represent probabilities. This might very well be right but because of this the properties of quanta are not to know quantitatively. And this fact that properties of quanta are not predictable, made Bohr to claim that quanta have no properties at all until they are measured or interact somehow.

This way of reasoning, however, is not logically necessary and it is not justified. The fact that properties of quanta are not predictable quantitatively doesn't necessarily mean that they have no properties. The claim quanta to have no properties until they are measured is leading to strange ideas in Quantum Mechanics. Ideas like superposition and complementarity.

Superposition is the idea that quanta are in many different states and/or positions at the same time, following no trajectories at all. When they are measured they choose one definite state or position which then becomes real. It is like the needle fell in all directions at the same time and when you look at it, it becomes a needle again that had fallen in one direction.

Complementarity is the idea that quanta have different kinds of properties and only one of them can be measured at a time. If in an experiment one kind of property is to be measured then how are quanta to know what kind of property they have to show? It is as if they are endowed with consciousness. Suppose a mechanism exists that picks in each experiment the right property to measure then at least all the properties must be present in each quantum to make it possible to be picked. Einstein, Podolsky and Rosen adressed this problem already in 1935.

Bell-test experiments.

When spin of entangled electrons is measured by detectors adjusted in the same direction then always results of opposite spin is obtained. This shows already that electrons have a definite spin from the moment they are produced. These results can not possibly be obtained when each electron chooses its spin arbitrarily and the results also can not be explained then. Otherwise it is as if the particles not only are conscious but also are they in contact with each other, in an inexplicable way, being far apart from each other.

The ideas of superposition and complementarity are very strange indeed. And, as stated before, they are not justified. Fortunately we don't need these ideas if we just accept (as Einstein believed) that quanta have definite properties from the moment they are produced. Then entanglement exists in the sense of resonance: same frequencies, same amplitudes and opposite phase (opposite properties). Not in the sense of inexplicable interaction between particles at large distances or in the sense of inexplicable information exchange. Superposition exists in the sense of interference and complementarity exists in the sense of quanta posessing wave- and particle properties at the same time.

Then there is no need for a non-local universe because with definite spin of electrons and projection and perspective correctly applied, the Quantum Mechanic correlation in Bell-test experiments is perfectly explicable, see: ref. 1.

References:

1. https://www.youtube.com/watch?v=g1quDMTEIFE (video)