Phenomelogy of quantum states

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Theories of classical physics do not need the necessity for an interpretation of the meaning of their mathematical symbols. They are abbreviations of concepts derived from the observed phenomena of the macroscopic world and thus already endowed with it. As to fundamental equations, then the character of their actions is in harmony with the course of the observed reality they designed to describe. Therefore we have an intuitive understanding of classical physics.

The opposite situation is in quantum physics. It has an acute need for an interpretation. The reason for it is that the symbols of its mathematical formalism are no more abbreviations of concepts emerging from the observed phenomena. Its fundamental equations are not derivable from empirical data by the analogy of the classical case but appear in an ad hoc manner. This lack of a direct link between mathematical formalism and empirical reality and the abstract character of equations makes quantum theory incomprehensible.

Nevertheless, it works, giving a complete and consistent description of all quantum phenomena. It means that to elicit the meaning of quantum physics's conceptual content, one must go beyond the frameworks of its theory. In particular, since quantum states whose existence is not deducible from any observations correctly describe measurement results, one must recognize a kind of realness that belongs to them. More precisely, it follows from the eigenvalue- eigenstate link axiom: In the measurement of an observable, existence of its eigenstates macroscopically manifests as measurement outcomes - eigenvalues. It does not mean that a quantum object comes into an eigenstate (an observable acquires a numerical value) in the act of measurement. It must already be in an eigenstate of an observable in order for this state to realize in measurement.

However, the kind of reality of quantum states cardinally differs from the well-known passive and inert material reality dominated in classical physics. Their existence has a kind of activity by indicating its non-material or non-physical nature.

At the quantum level, it happens the schism of material reality, as it were. The reality of a quantum object is the same as the reality of a macroscopic object - it is material. Non-material become its space-time dynamical properties.