STOCHASTIC ELECTRODYNAMICS
GENERAL CONSIDERATIONS

by

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Stochastic Electrodynamics is a tentative to account for the peculiarities of quantum physics from a completely classical point of view. It has the advantage over many other attempts on that way to be physically well defined and to lead to equations which are not impossible to solve, so that it is possible to check the theory against experiment or other theories, as quantum mechanics.

The epistemological challenge to contemporary physics is the difficulty of coexistence, if not of passage between quantum mechanics and the whole body of classical theories. Such a situation is one of crisis, because the main goal of scientific activity seems to be the unification of different theories, or at least the building of a dictionary of correspondence between the concepts and laws of different theories. Contemporary theoretical physics has not yet been able to achieve a satisfactory unification, despite some efforts.
in this direction (1-4). Most of the physicists think that quantum ideas are going to prevail and be the nucleus of the future unification of physics; they think that after the mechanical view of nature and the electromagnetic view of nature (5) there will be a quantum view of nature. Such a trend becomes apparent when fundamental concepts of classical theories are considered as less relevant as corresponding concepts in quantum theory. A good example of such a situation is given by the tendency to present statistical physics from a quantum point of view (e.g. Kittel (6)), considering that "a correct definition of entropy is only possible in the framework of Q.M., whereas in classical mechanics entropy can only be introduced in a somewhat limited and artificial manner" (7).

Another example is given by the definition of a "macroscopic level of quantum mechanics" (8) and by the current speaking about quantum behaviour on a macroscopic scale for lasers, supra-conductors and superfluids (9).

From the historical point of view it is interesting to stress that quantum theory arose in the very moment where the existence of the proof of atomic reality would have seemed to lead to a definitive triumph of some mechanical picture of the world. After fifty years of progressive domination of the quantum ideology, classical theories develop again, showing their power for the description of reality. "The increasing importance of dynamical macro-systems in physics, chemistry and biology has moved classical physics out of the shadow of quantum theory into the actuality of modern research" (10). In fact "a primary atomism" where the discontinuity of matter and radiation are irreducible a priori explanations, is progressively replaced by an "organic atomism" which gives a generative description of discontinuities from continuous and inorganized systems. The successes of the qualitative