Controversy between Einstein and Bohr after 75 years, its actual solution and the consequences for the present

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The scientific community is still convinced that the controversy (in 1935) between Einstein and Bohr was decided definitely in 1982 when it was shown experimentally that Bell's inequalities (derived in 1964) were violated. The Copenhagen quantum mechanics has been accepted as the only theory of microworld as it has been commonly believed that the given inequalities have been valid in the framework of hidden-variable theory (corresponding to Einstein's ontological requirements). However, they were derived on the basis of the assumption valid only in classical physics (not in any quantum alternative). It means that the hidden-variable theory must be taken as fully acceptable. On the other side serious arguments may be brought against the Copenhagen quantum mechanics (internal contradictions in mathematical model as well as experimental data contradicting predictions in decisive way). All these arguments have been summarized in [1]; corresponding details being found in papers quoted there.

However, some important consequences have followed from the given results, which will be shown in the poster (together with main arguments):

1. Even if both the quantum alternatives have started from Schrödinger equation their physical contents have been fundamentally different; the original physical interpretation of Schrödinger solutions having been strongly deformed by the requirement put by Bohr on the corresponding Hilbert space formed from the given solutions.

2. The hidden-variable theory has been represented practically by the solutions of Schrödinger equation when any additional conditions have not been put on the corresponding Hilbert space.

3. There is only a smaller difference between the Schrödinger equation and classical physics as all basic solutions (characterized always by one Hamiltonian eigenfunction only) correspond to those of Hamiltonian equations and all superpositions correspond to the statistical combinations of classical states. It does not hold fully in opposite way in the case of discrete Hamiltonian spectrum as the Hamilton equations admit always all possible energy values.

4. The Schrödinger equation (or the hidden-variable theory) may represent the common theory of macroscopic and microscopic worlds if one admits that the corresponding quantization exists in the macroscopic world, too, when fully negligible (immeasurable) differences exist between corresponding discrete energy values.

[1] M.V. Lokajíček, NeuroQuantology (section: Basics of Quantum Physics) 8 (2010), 4, 605-10; see also arXiv: 1004.3005 [quant-ph].