The Topological Qubit: Quantum Evolution via Sheaves

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We consider some generalization of the theory of quantum states, which is based on the analysis of long standing problems and unsatisfactory situation with existing interpretations of quantum mechanics/Local Quantum Field Theory. We demonstrate that the consideration of quantum states as sheaves can provide, in principle, more deep understanding of some well-known phenomena. The key ingredients of the proposed construction are the families of sections of sheaves with values in the proper category of the functional realizations of infinite-dimensional Hilbert spaces with special (multiscale) filtrations decomposed into the (entangled) orbits generated by actions/representations of internal hidden symmetries. In such a way, we open a possibility for the exact description of a lot of phenomena like entanglement and measurement, wave function collapse, self-interference, instantaneous quantum interaction, Multiverse, hidden variables, etc. In the companion paper we consider the machinery needed for the generation of a zoo of the complex quantum patterns during Wigner-Weyl-Moyal evolution together with constructive algebraic control.