

FROM POINTS TO PATTERNS IN WIGNER FRAMEWORK, 1: QUANTUM STATES AS 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. 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, many-Worlds, hidden variables, etc. In the companion paper we consider the machinery needed for the generation of a zoo of the complex quantum patterns in ensembles during Wigner-Weyl-Moyal evolution together with constructive algebraic control.

[1] Antonina N. Fedorova, Michael G. Zeitlin, Quantum multiresolution: tower of scales, arXiv:1703.09556

[2] Antonina N. Fedorova, Michael G. Zeitlin, Quantum objects in a sheaf framework, arXiv:1703.09546