

Quantum Central Limit Theorems, Emergence of Classicality and Time-dependent Differential Entropy

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We derive some Quantum Central Limit Theorems for expectation values of macroscopically coarse-grained observables, which are functions of coarse-grained hermitean operators consisting of non-commuting variables. Thanks to the hermicity constraints, we obtain positive-definite distribution for the expectation values of observables. These probability distributions also open some pathway for an emergence of classical behaviours in the limit of infinitely large number of identical and non-interacting quantum constituents. This is in contradistinction to other mechanisms of classicality emergence due to environmental decoherence and consistent histories. The probability distributions so derived further enable us to evaluate the nontrivial $\{it$ time-dependence $\}$ of certain differential entropies.