

Log-Analytic Uncertainty Relation

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We address the question of what characteristics of the quantum wave function phase can be measured. In particular we are interested in those phase aspects that can be deduced from the amplitude of the wave function. This will be shown to be connected to the topological characteristics of the Logarithm of the wave function in the complex time domain through a relation which is the temporal equivalent to the Kramers – Kronig formulae in the frequency domain. In particular for a wave packet which is reflected from an infinite potential barrier certain characteristics of the phase can be deduced provided that the momentum of the particle time the distance from the barrier is smaller than Planck constant over two and cannot be deduced otherwise. That is the phase characteristics cannot be deduced if the momentum of the particle time the distance from the barrier is bigger than Planck's constant over two which creates an experimental uncertainty in the phase.