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# Fingerprints of the quantum space-time in time-dependent quantum mechanics: An emergent geometric phase

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In the vicinity of Planck length scale, only where the quantum gravitational effects are expected to be observed, any attempt towards localization of an event inevitably results in gravitational collapse. To avoid such a scenario one needs to postulate noncommutative algebra between space-time coordinates, which are now promoted to the level of operators. On the other hand, a consistent formulation of Quantum mechanics itself, with time being an operator is a challenging and longstanding problem. Here we have given a systematic way to formulate non-relativistic quantum mechanics on 1+1 dimensional "quantum"space-time (Moyal type noncommutativity) in a user friendly way, which mandates the formulation of an equivalent commutative theory. Although the effect of noncommutativity of space-time should presumably become significant at a very high energy scale, it is intriguing to speculate that there should be some relics of the effects of quantum spacetime even in a low energy regime. With this motivation in mind we undertake the study of time dependent system, for example forced harmonic oscillator in quantum space-time, where time is also an operator and have shown the emergence of geometric phase, which vanishes if the noncommutative parameter is put to zero, proving the fact that, occurrence of geometric phase for the above system is totally dependent on the non-commutativity of spacetime.

## Session

Formal Theory

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