

Quantum Coherence from Quantum Spacetime

Wednesday 9 July 2025 16:00 (20 minutes)

We investigate the emergence of quantum coherence and quantum correlations in a two-particle system with deformed symmetries arising from the quantum nature of spacetime. We demonstrate that the deformation of energy-momentum composition induces a momentum-dependent interaction that counteracts the decoherence effects described by the Lindblad equation in quantum spacetime. This interplay leads to the formation of coherence, entanglement and other correlations, which we quantify using concurrence, the l_1 -norm of coherence, quantum discord and Local Quantum Fisher Information. Our analysis reveals that while the openness of quantum spacetime ultimately degrades entanglement, it also facilitates the creation and preservation of both classical and quantum correlations. Finally, we examine the effects of temperature on this system.

Working Group

WG5 - Connection between low-energy and high-energy quantum gravity

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Session Classification: WG5 Connection between low-energy and high-energy quantum gravity