

# Facets of Unitarity Violation in Dynamical Spacetimes

We investigate the roots of unitarity violations of quantum field theory in dynamical spacetimes and its connection to back-reactions and measurement processes. Within the framework of effective field theories, local observables require compact configuration spaces given by the domain of validity of the effective description and in accordance with detector specifications. Using the functional Schrödinger representation of quantum field theory, we investigate how compact configuration spaces cause unitarity violations in quantum evolution groups. The loss of unitarity can be traced back to two (distinct) phenomena: An increasing impact of back-reactions and the information loss associated with the detector failing to distinguish quantum fluctuations from classical backgrounds.

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