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**Witness for Initial System-Environment Correlations in Open System Dynamics**

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Abstract:

We study the evolution of a general open quantum system when the system and its environment are initially correlated. We show that the trace distance between two states of the open system can increase above its initial value, and derive tight upper bounds for the growth of the distinguishability of open system states. This represents a generalization of the contraction property of quantum dynamical maps. The obtained inequalities can be interpreted in terms of the exchange of information between the system and the environment, and lead to a witness for system-environment correlations which can be determined through measurements on the open system alone.